United Nations | Department of Economic and Social Affairs

E-Government Survey 2020

Digital Government in the Decade of Action for Sustainable Development

With addendum on COVID-19 Response

Department of Economic and Social Affairs

UNITED NATIONS E-GOVERNMENT SURVEY 2020

DIGITAL GOVERNMENT IN THE DECADE OF ACTION FOR SUSTAINABLE DEVELOPMENT

UNITED NATIONS
New York, 2020
publicadministration.un.org

United Nations Department of Economic and Social Affairs

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ST/ESA/PAD/SER.E/214

Sales no.: E.20.II.H.1

ISBN: 978-92-1-123210-3

eISBN: 978-92-1-005145-3

Print ISSN: 2411-8257

eISSN: 2411-829X

United Nations E-Government Surveys:

2020 Digital Government in the Decade of Action for Sustainable Development

2018 Gearing E-Government to support transformation towards sustainable and resilient societies

2016 E-Government for Sustainable Development

2014 E-Government for the Future We Want

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2008 From E-Government to Connected Governance

2005 From E-Government to E-Inclusion

2004 Towards Access for Opportunity

2003 World Public Sector Report: E-Government at the Crossroads

2001 Benchmarking E-Government: A Global Perspective

Website: publicadministration.un.org

Layout: United Nations, UNON Publishing Services Section – ISO 14001:2004 Certified, Nairobi. (EP #20-01016)

Cover Design: United Nations Department of Global Communications, New York

Photo credit: pixabay.com

Printed at the United Nations, New York

Foreword

The launch of this 11th edition of the UN E-Government Survey in 2020 is taking place during unprecedented times. With just 10 years remaining to achieve the Sustainable Development Goals (SDGs) – the shared vision of all countries to end poverty and build a peaceful, sustainable world for all people – an ambitious Decade of Action to deliver the SDGs has been launched. This has mobilized governments, civil society, and businesses, and called on all people to take action and make the Goals their own. Digital government supports the Decade of Action through its growing role in delivering sustainable, inclusive and equitable services to everyone, everywhere – leaving no one behind.

Amidst the global outbreak of the COVID-19 pandemic, however, everyday life is changing in unimaginable ways. With social distancing and quarantine measures underway to stop the spread of the virus, digital solutions have become vital to address isolation and keep people informed and engaged. Governments around the world are exploring new ways to engage and to provide clear, up-to-date information to the public and to health workers, while working alongside and with stakeholders to reduce the spike in misinformation and disinformation. However, with rapid and assertive digital efforts to manage the effects of the pandemic at community levels, concerns over data privacy and digital divides have re-emerged. This has immediately put to test the e-government national visions, tools and applications that countries have invested in the past years. The COVID-19 pandemic has presented policymakers at all levels of government with unprecedented challenges to respond to the critical needs of their countries.

The 2020 Survey findings are encouraging, showing significant uptakes in digital services in different geographic regions, countries and cities. E-participation and data-centric approaches have been enhanced, and the focus in building digital capacities has increased. Yet, the progress is confronted with existing and new challenges and risks, such as cybersecurity and data privacy. Some considerations are especially urgent or important in developing countries including countries in special situations. These include lack of digital infrastructures, sustainable e-government platforms and limited resources for implementing digital government policies. While e-government has reached sophistication in leading countries, going digital remains relatively new on national agendas of some countries.

Digital government roadmaps should be supported by a long-term vision, national leadership and requisite capacities. They should be able to stand the test of time and in mitigating crises, as we witnessed during the COVID-19 pandemic. This is evident through the longitudinal analysis of the Survey since its inception in 2001. The Survey has been widely recognised by digital ministers, national chief information officers, and other policymakers and researchers in e-government development. As a flagship publication of the United Nations Department of Economic and Social Affairs, while fulfilling our mandate towards sustainable development for all, the Survey has become an indispensable benchmarking and development tool for countries in their digital government pursuit.

The year 2020 was significant in the global benchmarking of e-government, as governments are reminded more than ever about the importance and relevance of digital government. Digital transformation is now a critical part of the national sustainable development of many countries.

I urge e-government leaders to remain steadfast in their missions in the digital transformation of their countries, constantly innovating even during difficult times. Partnerships are more important than ever, between governments and the private sector, and among countries in the same region or across national digital government teams. A global mindset with a global outlook, while addressing national and local needs, is needed as we advance towards future digital government in the Decade of Action.

LIU Zhenmin
Under-Secretary-General for Economic and Social Affairs
United Nations

Acknowledgements

The 2020 United Nations E-Government Survey was prepared by the Department of Economic and Social Affairs of the United Nations (UN DESA), through its Division for Public Institutions and Digital Government (DPIDG) over a two-year period (from July 2018 to June 2020). The report was prepared under the responsibility of Juwang Zhu (Director, DPIDG), by a team of United Nations staff led by Vincenzo Aquaro. The team comprised Adriana Alberti, Enkel Daljani, Yusuf Ekrem Eren, Debbie Gatan, John-Mary Kauzya, Arpine Korekyan, Wai Min Kwok, David Le Blanc, Madeleine Losch, Rachael Purcell, Elida Reci and Deniz Susar.

The lead authors for the chapters were: Vincenzo Aquaro and Arpine Korekyan (Chapters 1 and 2); Elida Reci (Chapter 3); Deniz Susar and Delfina Soares, with co-authors Ayman Alarabiyat, Mariana Lameiras and Dimitrios Sarantis (Chapter 4); David Le Blanc (Chapter 5); Wai Min Kwok (Chapter 6); Adriana Alberti and John-Mary Kauzya (Chapter 7); and Deniz Susar, assisted by Micaela Mihov (Addendum on COVID-19). The Data Management Team was overseen by Vincenzo Aquaro.

Close collaboration efforts with various UN agencies and offices were established in the research and report writing process. Contributing organizations for Chapter 3 included: United Nations Economic Commission for Africa (UN ECA), United Nations Economic Commission for Europe (UN ECE), United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), United Nations Economic and Social Commission for Western Asia (UN ESCWA); and, for Chapter 4: United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV) and United Nations Human Settlements Programme (UN Habitat). Support in the production of the maps used in this report was provided by the United Nations Geospatial Information Section (New York).

This report was subject to **external peer review** to ensure quality and objectivity. External peer reviewers were: Delfina Soares, Sarantis Demetrios, Roberto Bellotti, Salim Hasham (Chapters 1 and 2); Tim Unwin, Carlos Santiso (Chapter 3); Antonio Tavares, Judy Backhouse, Robert Ndugwa (Chapter 4); Kim Andreasson, Aránzazu Guillán Montero, (Chapter 5); Matthias Reister, Lydia Clougherty Jones, Zheng Lei (Chapter 6); Fernando Fernandez-Monge Cortazar, Limon Rodriguez, Marco T. Cajas L., Theresa Pardo, Samuel Adams (Chapter 7); Laura Rocha (Addendum on COVID-19).

This report also benefited from insights shared by external experts at two **Expert Groups Meetings**, on 1-2 April 2019, New York – "E-Government, Digital Cooperation and the Sustainable Development Goals (SDGs) In Preparation of the United Nations E-Government Survey 2020"; and on 6-7 December 2018, New York – "The Role of Public Institutions in the Transformative Impact of New Technologies". Experts included: Amir Banifatemi, Luis Barbosa, Wendy Carrara, Maria Rosaria Ceccarelli, Rachel Chen, Nicola Coniglio, Mariana Dahan, Haidar Fraihat, Julia Glidden, Valentine Goddard, Tomás González, Irvin Halman, Salim Hasham, Ralph Heinrich, Nibal Idlebi, Thure Krarup, Ibrahim Kushchu, Enzo Maria Le Fevre, Jae-hong Lim, Preetam Maloor, Odhran James McCarthy, Trent McConaghy, Samia Melham, Minerva Novero-Belec, Nnenna Nwakanma, Atsuko Okuda, Theresa Pardo, Diana Parra Silva, Vinícius Carvalho Pinheiro, Joachim Post, Mila Romanoff, Mactar Seck, Kjartan Sorensen, Theo Veltman, Markus Woltran, Yoshiyuki Yamamoto, Jing Zhang and Lei Zheng.

Contributing individuals

Substantive contributions were provided by UN DESA staff: Anni Hataaja, Victoria Kim, Jonas Rabinovitch, Keping Yao, Mi Kyoung Park, Stefania Senese, Said Maalouf and Simen Gudevold.

DPIDG interns provided general research support: Isabella Bremmers, Anindita Chakraborty, Ruoyan Hu, Hassaan Ali Khan, Jaejin Kim, Qianxin Li, Sun Li, Yihan Li, Olivia Lin, Darren M. McCrate, Micaela Mihov, Lou Ngonga, Barry O'Connell, Laura Rocha, Yangfan Tan, Weiyu Wang, Pritta Andrani Widyanarko, Huiqi Wu, Junhui Xu, Han Chen Zhi, Jiahui Zou.

Data management and statistics support was provided by Ayman Alarabiat, Anushavan Hambardzumyan and Jeremy Marand. The chapters of the publication were edited by Terri Lore.

United Nations Volunteers provided research support for work related to the assessment of the Online Services Index and the Local Online Services Index (a complete list of these contributors is available in the annexes).

Contributing Member States and organizations:

In response to a "call for inputs", the following Member States submitted contributions that assisted the research and drafting processes for this report: Albania, Azerbaijan, Bahrain, Bangladesh, Bulgaria, China, Czech Republic, Finland, Greece, Kazakhstan, Kyrgyzstan, Malaysia, Oman, Poland, Portugal, Qatar, Saudi Arabia, Ukraine, United Arab Emirates and United Kingdom.

Special thanks is extended to the following partners, who will translate this report into UN official languages other than English: the Telecommunication Regulatory Authority, United Arab Emirates (Arabic); the China National Academy of Governance (Chinese); the Ministry of Digital Development, Innovations, and Aerospace Industry and Zerde National Infocommunication Holding JSC, Kazakhstan (Russian); University of Buenos Aries, School of Law, Laboratory of Innovation and Artificial Intelligence (Spanish).

Acronyms

5G	Fifth generation wireless technology for digital cellular networks
ADDR	Arab Digital Development Report
ADB	Asian Development Bank
AfCFTA	African Continental Free Trade Area
AI	artificial intelligence
ALESCO	Arab League Educational, Cultural and Scientific Organization
AP-IS	Asia-Pacific Information Superhighway
APEC	Asia-Pacific Economic Cooperation
API	application programming interface
app	application
AR	augmented reality
ASAN	Azerbaijan Service and Assessment Network
ASEAN	Association of Southeast Asian Nations
ASL	American Sign Language
AU	African Union
BEREC	Body of European Regulators of Electronic Communications
BPS	Boston Public Schools
BRI	Belt and Road Initiative
CAF	Development Bank of Latin America
CDO	chief data officer
CIO	chief information officer
CO2	carbon dioxide
COVID-19	Coronavirus Disease 2019
CTR-E	Electronic Waste Transport Control (Brazil)
CVPD	Chula Vista Police Department
D4D	Digital for Development (initiative)
DEWA	Dubai Electricity and Water Authority
DiGIT4SD	Digital Government Implementation Toolkit for Sustainable Development
DPIDG	Division for Public Institutions and Digital Government
ECA	United Nations Economic Commission for Africa
ECE	United Nations Economic Commission for Europe
ECLAC	Unitd Nations Economic Commission for Latin America and the Caribbean
EDPD	European Data Protection Board
EGDI	E-Government Development Index
eLAC	Digital Agenda for Latin America and the Caribbean
EMS	Emergency and Security Systems
EPI	E-Participation Index
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ESCWA	United Nations Economic and Social Commission for Western Asia
EU	European Union
GCC	Gulf Cooperation Council

GDP	gross domestic product
GEMS	Government Electronic and Mobile Services (Maturity Index)
GIFMIS	Government Integrated Financial Management Information System
GNI	gross national income
GPSDD	Global Partnership for Sustainable Development Data
HCI	Human Capital Index
HR	Human Resources
HTTPS	Hypertext Transfer Protocol Secure
HV	high-very high (rating class or quartile subgroup)
IADB	inter-American Development Bank
IBM	International Business Machines
ICT	information and communications technology
ID	identity/identification
IEC	International Electrotechnical Commission
IGF	Internet Governance Forum
ILO	International Labour Organization
IoT	Internet of Things
ISO	International Organization for Standardization
IT	information technology
ITU	International Telecommunication Union
LDC	least developed country
LED	light-emitting diode
LGQ	Local Government Questionnaire
LGQ	Local Government Questionnaire
LLDC	landlocked developing country
LM	low-middle (rating class or quartile subgroup)
LOSI	Local Online Services Index
M2M	machine to machine
MH	middle-high (rating class or quartile subgroup)
MIT	Massachusetts Institute of Technology
MSQ	Member States Questionnaire
NGO	non-governmental organization
NIRS	National Information Resources Service
OAS	Organization of American States
OECD	Organization for Economic Cooperation and Development
OGD	open government data
OGDI	Open Government Development Index
OMB	(White House) Office of Management and Budget (United States)
OSI	Online Services Index
OURdata	Open, Useful and Re-usable data (Index)
PAIGE	Procurement Answers and Information Guided Experience
pdf	portable document format

PEPP-PT	Pan-European Privacy-Preserving Proximity Tracing
PNBL	Plano Nacional de Banda Larga
PRIDA	Policy and Regulation Initiative for Digital Africa
QR	Quick Response (code)
R&D	research and development
RDF	Resource Description Framework
Red GEALC	Network of e-Government Leaders of Latin America and the Caribbean
RSS	Rich Site Summary
SAMOA Pathway	Small Island Developing States Accelerated Modalities of Action Pathway
SDG	Sustainable Development Goal
SIDS	small island developing State(s)
SIM	subscriber identification module
SMEs	small and medium-sized enterprises
SMS	short message service
SPECA	United Nations Special Programme for the Economies of Central Asia
SSOT	single source of truth (Singapore)
STEM	science, technology, engineering and math
TC	Trusted Centre (Singapore)
TCoP	Technology Code of Practice
TII	Telecommunications Infrastructure Index
UAE	United Arab Emirates
UK	United Kingdom (of Great Britain and Northern Ireland)
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UN/EDIFACT	United Nations Electronic Data Interchange for Administration, Commerce and Transport
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
UNU-EGOV	United Nations University Operating Unit on Policy-Driven Electronic Governance
UXP	user experience platform
VAT	value-added tax
VH	very high (rating class)
VR	virtual reality
W3C	World Wide Web Consortium
WCAG	Web Content Accessibility Guidelines
WFP	World Food Programme
WHO	World Health Organization
WSIS	World Summit on the Information Society
WTO	World Trade Organization

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About the Survey

Scope and purpose

Since 2001, the United Nations Department of Economic and Social Affairs (UN DESA) has published the United Nations E-Government Survey. Over the past ten editions it has established itself as both a leading benchmarking reference on e-government and a policy tool for decision makers.

The Survey is the only global report that assesses the e-government development status of all United Nations Member States. The assessment measures e-government performance of countries relative to one another, as opposed to being an absolute measurement. It recognizes that each country should decide upon the level and extent of its e-government initiatives in keeping with its own national development priorities and achieving the SDGs.

It serves as a benchmarking and development tool for countries to learn from each other, identify areas of strength and challenges in e-government and shape their policies and strategies in this area. It is also aimed at facilitating and informing discussions of intergovernmental bodies, including the United Nations General Assembly, the Economic and Social Council and the High-Level Political Forum, on issues related to e-government and to the critical role of ICTs in sustainable development.

The Survey is intended mainly for policy makers, government officials, academia, civil society, private sector and other practitioners and experts in the areas of sustainable development, public administration, digital government and ICTs for development.

Structure and methodology

The Survey measures e-government effectiveness in the delivery of public services and identifies patterns in e-government development and performance as well as countries and areas where the potential of Information and Communications Technologies (ICT) and e-government has not yet been fully exploited and where capacity development support might be helpful.

The Survey is composed of an analytical part and of data on e-government development contained in the annexes of the publication, providing a snapshot of relative measurement of e-government development of all Member States.

The methodological framework for the collection and assessment of the Survey's data on e-government development is based on a holistic view of e-government that incorporates three important dimensions that allow people to benefit from online services and information: the adequacy of telecommunication infrastructure, the ability of human resources to promote and use ICTs, and the availability of online services and content.

The methodology for the analytical part of the Survey is based on a literature review and an analysis of the Survey's data. Innovative practices are also collected to illustrate how ICTs are being used to transform public administration and institutions in support of sustainable development. In addition, during the preparatory process of the publication, expert group meetings are organized to solicit views and inputs from world-renowned scholars and practitioners.

The Survey tracks progress of e-government development via the United Nations E-Government Development Index (EGDI). The EGDI, which assesses e-government development at the national level, is a composite index based on the weighted average of three normalized indices. One-third is derived from the Telecommunications Infrastructure Index (TII) based on data provided by the International Telecommunications Union (ITU), one-third from the Human Capital Index (HCI) based on data mainly provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO), and one-third from the Online Service Index (OSI) based on data collected from an independent Online Service Questionnaire (OSQ), conducted by UNDESA, which assesses the national online presence of all 193 United Nations Member States, complemented by a Member State Questionnaire (MSQ). The survey questionnaire assesses a number of features related to online service delivery, including whole-of-government approaches, open government data, e-participation, multi-channel service delivery, mobile services, usage uptake and digital divides, as well as innovative partnerships through the use of ICTs. This data is collected by a group of researchers under the supervision of UN DESA through a primary research and collection endeavour.

As a composite indicator, the EGDI is used to measure the readiness and capacity of national institutions to use ICTs to deliver public services. This measure is useful for government officials, policy makers, researchers and representatives of civil society and the private sector to gain a deeper understanding of the relative position of a country in utilizing e-government for the delivery of public services.

The methodological framework has remained consistent across Survey periods while its components have been updated to reflect new trends in e-government as well as new indicators for telecommunications and human capital. The 2004 and 2005 editions of the Survey captured the state of a country's readiness for e-government. However, in 2008, as "readiness" was not deemed to adequately reflect the need for concrete implementation on the ground, the publication changed its focus from assessing readiness to assessing actual development. In 2014, "e-government maturity" was viewed as obsolete since e-government goals and targets are constantly evolving to deliver and surpass what the public expects (UN DESA, 2014). In 2018, the questionnaire to assess the government portals, OSQ was expanded to include the main principles of the SDGs and Leaving No One Behind, with a particular focus on Goal 16, namely accountability, effectiveness, inclusiveness, openness and trustworthiness. A Member State Questionnaire (MSQ) was also introduced to further gather detailed information about the countries' institutional, legal and strategy frameworks and the efforts of public institutions in e-government development.

The 2020 Survey's data is presented both at the end of the publication and online. This includes data relative to the EGDI by country (in alphabetical order), by region and by countries in special situations, i.e. Small Island Developing States (SIDS), Landlocked Developing Countries (LLDCs), Least Developed Countries (LDCs). The publication then presents information about the Online Service Index and its components; the Telecommunication Infrastructure Index and its components; and the Human Capital Index and its components. Information about the E-Participation Index (EPI) is also contained in the data tables (with a detailed discussion on the topic in Chapter 5 of this edition). Further comprehensive information about the methodology of the 2020 Survey is available in the Annexes.

Preparatory process of the 2020 Survey

The preparatory process of the 2020 Survey included a number of activities. Two Expert Group Meetings (EGMs) (both held in New York, in December 2018 and April 2019) were organized to allow experts in the field of digital government to exchange views on challenges, identify emerging issues from a sustainable development perspective, and reflect/review/update the current methodology of the Survey.

For the Online Service Index (OSI) values for 2020, a total of 215 online United Nations Volunteer (UNV) researchers from 96 countries with coverage of 66 languages assessed each country's national website in the native language using the Survey's Online Service Questionnaire. In addition, all United Nations Member States were requested (through the Member State Questionnaire) to provide information regarding their website addresses (URL) for different government ministries and the national portal(s). 139 Member States (comprising 72% of UN membership) returned the completed questionnaires, and the appropriate submitted sites were then utilized during the verification process.

What was changed in the 2020 edition compared to 2018

To improve the methodology and take into account the lessons learned from the previous editions, the inputs and feedback received by Member States, the recommendations from the external evaluation, the outcomes of the EGMs and the latest technological and policy development, a limited number of changes were introduced in the 2020 Survey as summarized below:

- The Telecommunication Infrastructure Index (TII) calculated with four components instead of five in 2018, due the drop of the "Fixed-telephone subscriptions (per 100 inhabitants)" sub-indicator. For all the four sub-indicators an upper cap threshold of 120 per cent was introduced.
- In the Human Capital Index an upper cap threshold of 100 per cent was introduced for the Gross enrolment ratio sub-indicator.
- The Online Service Questionnaire (OSQ) reviewed the existing questions and added new ones related to justice systems' online services.
- The EGDI results – which are categorized in Very-High, High, Middle and Low groups – have been further broken down into four equally defined intervals (rating classes), identified by the first, the second and the third quartile, within each group, to provide a more granular cluster analysis of countries with similar performances in each group.
- The pilot assessment of local e-government development has been expanded from 40 cities in 2018 to 100 cities in 2020. The Local Online Service Questionnaire was reviewed and aligned with the OSI methodology.

Executive Summary

The year 2020 marked 20 years of benchmarking the e-government development of the Member States of the United Nations. Since its inception in 2001, the United Nations E-Government Survey (hereinafter referred to as the Survey) has become an indispensable "ranking, mapping and measuring" tool for policymakers and analysts engaged in comparative analysis and contemporary research on e-government.[1]

The year 2020 also witnessed a transformational change in the global development agenda as United Nations Secretary-General António Guterres announced the launch of the Decade of Action for Sustainable Development to bolster efforts to achieve the Sustainable Development Goals (SDGs) by 2030. The Decade of Action is central to global efforts to eradicate poverty and to improve economic growth, social protection, health (including pandemic response), education, energy, water and sanitation, sustainable transport and infrastructure, and Internet access.[2] Digital government supports the Decade of Action through sustainable, inclusive and equitable public service provision for all people everywhere, leaving no one behind—and more broadly through its growing role in driving innovation, strengthening efficacy, and generating solutions.

Growing digital government

Primary data collected for the 2020 Survey showed that many more countries and municipalities are pursuing digital government strategies, some of which are radically different from those guiding earlier e-government initiatives. Some of the new approaches Governments are taking in pursuit of digital government transformation include the delivery of e-government as a platform, the integration of online and offline multichannel delivery, the agile development of digital services (supported by whole-of-government and whole-of-society engagement and integration), the expansion of e-participation and partnerships, the adoption of data-centric approaches, the strengthening of digital capacities to deliver people-centric services, and the innovative use of new technologies such as artificial intelligence (AI) and blockchain, especially in the development of smart cities.

Even in countries in special situations and among those who are typically underserved and financially excluded in developing and developed countries, digital government services can be an equalizer. E-government can bring services and engagement opportunities directly to people in remote or underprivileged communities, providing them with access at home or through digital kiosks in villages. E-government is not about services provision alone; it also plays a role in strengthening digital literacy (Goal 4), digital inclusion (Goals 5, 8 and 10), digital connectivity (Goal 9), and digital identity (Goal 16).

Although countries around the world are eager to move forward with e-government, many Governments continue to face challenges linked to multiple contextual factors such as resource limitations, a lack of digital infrastructure, and insufficient capacities or capabilities, especially in developing countries and countries in special situations. Some countries face specific obstacles relating to issues such as digital inclusion, data privacy and cybersecurity.

Since early 2020, the global COVID-19 pandemic has reinvigorated the role of e-government. The utilization of conventional digital government services is becoming more widespread as social distancing drives online interaction, but e-government platforms are also being used to manage the crisis through innovative ways. While shelter-in-place and quarantine restrictions

have brought many "normal" economic and social activities to a halt, e-government is undergoing a stress test. When face-to-face interaction is impossible or discouraged, digital government solutions become vitally important. Countries with strong, versatile e-government systems in place have been able to provide clear, up-to-date information to the public, local authorities and health providers while also working with and alongside other stakeholders, such as platform providers, to reduce the spread of misinformation and to address cybersecurity and data privacy issues. The evolving pandemic (at the time of this writing) has created opportunities for e-government to serve the public in new and vital ways. However, it has also heightened digital divides, as many among the poorest and most vulnerable in society lack access to digital government services and support.

It is in this context that the 2020 Survey is being published. Chapters 1 and 2 of the Survey provide a review and analysis of global and regional trends based on the 2020 E-Government Development Index (EGDI) constructed using primary data collected by the United Nations Department of Economic and Social Affairs (UN DESA). Chapter 3 highlights regional challenges, opportunities and initiatives relating to e-government development based on valuable contributions from the United Nations regional commissions and desk research. Chapter 4 provides an assessment of local e-government in 100 major cities using a methodology similar to that employed for the global Survey assessment but based on research carried out within the framework of a pilot study undertaken in partnership with the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV). Chapter 5 shifts the focus to online participation as reflected in E-Participation Index (EPI) data and provides an analysis of relevant policy trends. Chapter 6 highlights the importance of data governance at the national level and summarizes the prevailing trends surrounding data-centric digital services. Chapter 7 looks at the broader scope of capacity development for digital government transformation. A special addendum relating to the COVID-19 pandemic has been added to the 2020 Survey to illustrate how the role of e-government and efforts to achieve digital equity have been amplified by the nexus of digitalization and the societal impact of the pandemic.

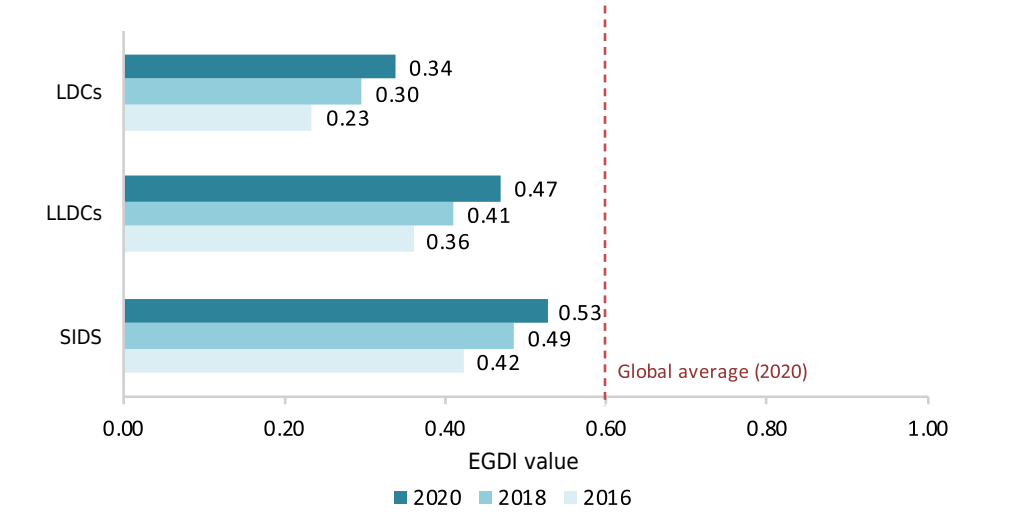
Throughout this publication, "e-government" and "digital government" are used interchangeably, as there is still no formal distinction made between the terms among academics, policymakers and practitioners. In many countries, the term e-government is embedded and institutionalized in national policies and strategies, though in some cases reference is made to digital government as the next phase of e-government.[3] In one research database, the Digital Government Reference Library (formerly the Electronic Government Reference Library),[4] there are 12,546 references to predominantly English-language peer-reviewed work in the study domains of e-government (or digital government), digital governance, and digital democracy.[5] In this Library and others, a significant majority of the academic references are to e-government rather than digital government.

Global trends

E-government development continues to advance, with the global average EGDI value increasing from 0.55 in 2018 to 0.60 in 2020. Progress is evident even in countries in special situations and among those with limited resources. The number of least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing States (SIDS) with high and very high EGDI values (above 0.50) has increased by 29 per cent since the last edition of the Survey.

The number of lower-middle income countries with high levels of e-development has increased by 57 per cent. The most significant improvement, however, was recorded in the lower-middle

Average EGDI values for countries in special situations, 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

income countries group, which advanced by more than 15 per cent, with average EGDI scores growing from 0.43 in 2018 to 0.50 in 2020.

Close to 80 per cent of Member States offer specific digital services for youth, women, older people, persons with disabilities, migrants and/or those in poverty, contributing to efforts aimed at leaving no one behind. Similarly, in line with the SDG 16 principles of greater transparency and accountability, more Governments are using online platforms for public procurement and for the recruitment of civil servants. Since 2018, there has been a 30 per cent increase in the number of countries publishing government vacancies online, with 80 per cent of Member States now offering this feature.

The top performers in e-government development (those in the highest rating class of the very high EGDI group) include Denmark, the Republic of Korea, Estonia, Finland, Australia, Sweden, the United Kingdom of Great Britain and Northern Ireland, New Zealand, the United States of America, the Netherlands, Singapore, Iceland, Norway and Japan.

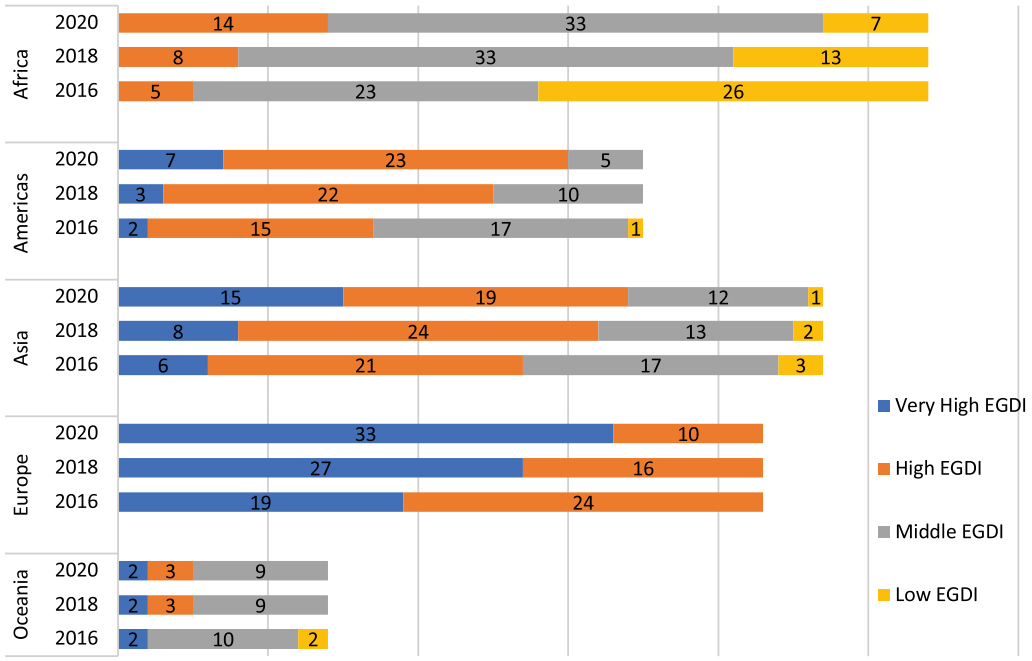
Key messages: global e-government development

- Globally, a continued increase in the uptake of e-government development is evident, with 65 per cent of Member States now in the high or very high EGDI group. More than 22 per cent of the countries surveyed have moved to a higher EGDI group since 2018. Progress has been especially noteworthy in countries in special situations (LDCs, LLDCs and SIDS).
- While there tends to be a positive correlation between the EGDI ranking and the income level of a country, financial resources are not the only critical factor in e-government development. Very often, a strong political will, strategic leadership, and the commitment to expanding the provision of digital services (as measured by the Online Service Index, or OSI) will allow a country to achieve a higher EGDI rank than might otherwise be expected.
- The provision of digital government services has improved significantly; more than 84 per cent of countries now offer at least one online transactional service, and the global average is 14. The most common digital services offered worldwide are registering a new business, applying for a business licence, applying for a birth certificate, and paying for public utilities.

Regional trends

All regions are making progress in e-government development, as evidenced by their higher average EGDI values. Europe remains the leader, with the highest proportion of countries in the very high EGDI group (58 per cent), followed by Asia (26 per cent), the Americas (12 per cent), and Oceania (4 per cent).

Regional distribution of countries by EGDI level, 2016, 2018 and 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

In Africa, even though countries continue to lag other regions, there are positive signs of accelerated advancement. Africa has the largest share of countries that have moved to a higher EGDI group (15 countries, or 28 per cent). However, persistent gaps in infrastructure and human capital development have prevented many countries in this region from moving to the higher EGDI levels. Asia has become the second most advanced region in e-government development, with its average EGDI value increasing from 0.58 in 2018 to 0.64 in 2020. Asia also has the greatest number of countries (8) that improved their EGDI rankings by more than 15 positions.

In the Americas, 86 per cent of the 35 countries surveyed have high or very high EGDI values. Europe has the most homogeneous e-government development and has been the global leader since the inception of the Survey. Oceania has countries at both end of the spectrum; while Australia is ranked 5th and New Zealand 8th overall, the other countries in this region have a combined average EGDI value of 0.44, which is markedly lower than the global average (0.60).

Europe has the largest proportion of countries (93 per cent) offering online services to vulnerable populations, followed by the Americas (84 per cent), Asia (80 per cent), Oceania (65 per cent) and Africa (55 per cent). Among the vulnerable groups, youth are the main service targets for many countries, while people living in poverty and migrants appear to have been largely neglected.

Key messages: regional e-government development

- All five regions improved their average EGDI values in 2020. Europe remains the leader, followed by Asia, the Americas, Oceania and Africa. In spite of the various challenges faced in Africa, significant progress has been made in e-government development; only 7 of the region's 54 countries remain in the lowest EGDI group.
- The Survey findings indicate once again that, notwithstanding the global progress made, digital government divides persist within and between regions. Although Asia and the Americas are comparable in their digital development overall, the e-government development gaps among countries in Asia are wider.
- Europe ranks highest in e-government services provision, with 95 per cent of countries offering at least 10 of the 20 online services assessed in the 2020 Survey. Online services provision is also expanding in other regions.

Regional challenges, opportunities and initiatives

While the EGDI reflects important aspects of progress in national e-government development, there are areas outside the EGDI scope and methodology—including regional partnerships and initiatives—that also warrant attention in order to provide a deeper understanding of digital government transformation efforts around the world. The United Nations regional commissions have identified a number of regional priority areas. Digital trade, digital economy and open government data are areas of focus among the member countries of the Economic Commission for Africa (ECA); the demand-focused evaluation of e-government, open government and the digital economy are priorities for the members of the Economic and Social Commission for Western Asia (ESCWA); Economic Commission for Europe (ECE) members are leveraging e-government for the diffusion of trade and transport facilitation; the role of digital government in disaster risk reduction has special relevance among the countries in the Economic and Social Commission for Asia and the Pacific (ESCAP) region; and the large-scale digitalization of core public sector functions and the adoption of strategic (rather than incremental or silo-based) policies and implementation plans are assigned primary importance among the country members of ESCAP and the Economic Commission for Latin America and the Caribbean (ECLAC).

Although each region has different priorities, they share some of the same challenges. Some of the areas requiring attention in every region include the following: political will, leadership and institutional capacities; technology diffusion and connectivity; trade and the digital economy as driving forces behind digital transformation; data, data inclusiveness, and the critical important of open data in building inclusive societies; digital skills as a cornerstone for the future in the employment, education, health and other sectors that are especially relevant to people's day-to-day lives; economic empowerment and gender divides; and smart cities and urbanization.

Leadership and collaboration are increasingly being recognized as key to advancing the regional digital agenda and the role of e-government in sustainable development. Joint initiatives such as Smart Africa, the ESCWA e-leaders initiative, eLAC2020/Red GEALC, and the Digital Agenda for Europe are manifestations of a growing understanding that the challenges and opportunities associated with digital transformation are best addressed through interregional and intraregional cooperation.

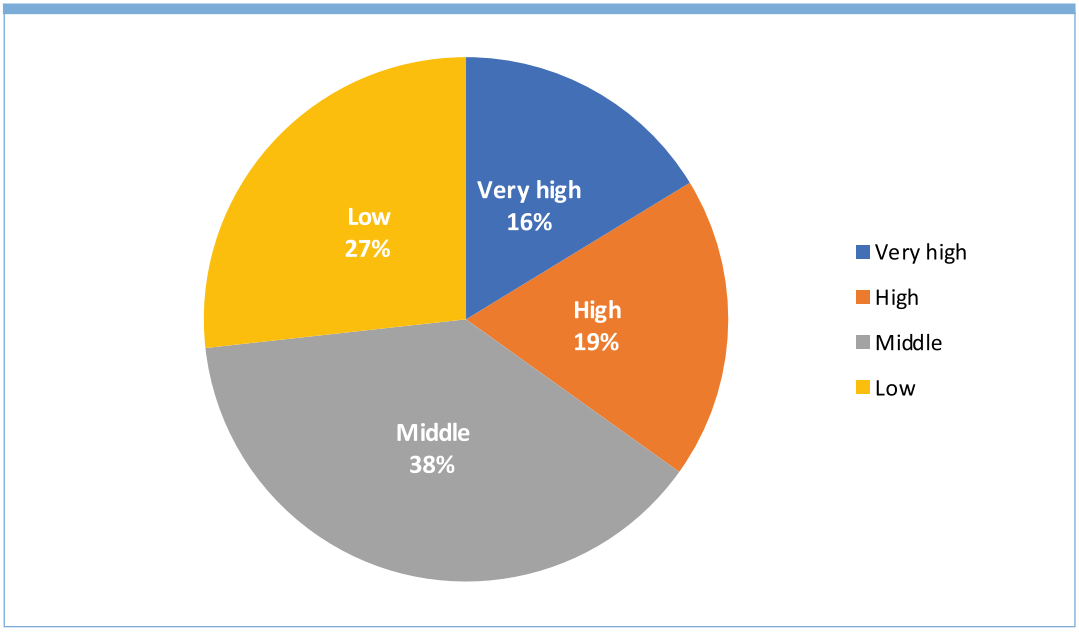
Key messages: regional challenges, opportunities and initiatives

- Recent years have seen an increase in regional initiatives and partnerships focused on e-government development, and the United Nations regional commissions have played an important role in leading or coordinating many of these efforts.
- Among the regional priorities highlighted by these initiatives are digital trade, digital economy, open government and open data, user-centric evaluation of regional e-government development, disaster risk mitigation, and large-scale digitalization of core public sector functions and the adoption of strategic digital policies and implementation plans at the national and regional levels.
- Such regional initiatives demonstrate the importance of regional cooperation and the relevance of digital transformation efforts in addressing both specific regional challenges and the common global development goals highlighted in the 2030 Agenda for Sustainable Development.

Local e-government development

E-government development is a rising priority in political agendas, but attention has been focused primarily on digital government transformation at the national level. Local e-government merits attention as well because city and municipal administrations have more direct interaction with residents and are responsible for addressing concerns affecting people's daily lives. As part of the 2020 Survey process, levels of e-government development were assessed for 86 of the 100 cities selected for review—a marked increase from the 40 cities evaluated as part of the pilot study first conducted in 2018. Among those assessed in 2020, 14 have very high Local Online Services Index (LOSI) levels; the majority of cities are in the middle or low LOSI groups.

Distribution of the cities assessed based on LOSI level



In some settings, local governments are creating "smart cities", harnessing and leveraging cutting-edge technologies to accelerate sustainable development. Specific strategies include using AI chatbots to improve service delivery and streamline internal workforce management; using big data and analytics to design and implement effective local government policies and to optimize urban public resources; using the Internet of Things to support smart applications in

health care, transport, law enforcement and emergency situations; and using augmented reality and virtual reality to enhance navigation experiences and driver safety and to support rescue operations. A number of cities are engaged in continuous innovation, employing novel digital applications to accommodate refugees, ease traffic congestion, safely dispose of solid waste, reduce air pollution, and address other high-priority issues. Such efforts are laudable but remain the exception rather than the rule; the use of (or intention to use) emerging technologies was found in fewer than a quarter of the cities studied, possibly owing to resource constraints or a lack of understanding of the advantages accruing from the use of such technologies.

Key messages: local e-government development in cities

- The findings of the 2020 LOSI survey reinforce those of the 2018 survey in affirming that levels of local e-government development are not necessarily consistent with national e-government development levels—which provides justification for the need to conduct separate assessments at the national and local levels.
- The 2020 LOSI average is 0.43, which implies that most city portals are still offering very basic features (such as information provision but little or no services provision). However, nearly all city portals are accessible from mobile devices, confirming the awareness of local governments of the importance of mobile technologies in multichannel service delivery.
- The findings point to the need for a shared vision and increased collaboration at the local level. To the extent possible, city or municipal e-government projects should involve all relevant stakeholders, including local residents, public and private sector entities, non-governmental organizations, and international organizations. Incentives could be provided to encourage small and medium-sized enterprises to participate as critical partners in developing and delivering innovative smart city projects. More collaboration among cities is needed so that local authorities with successful smart city initiatives can share insights with those that are still searching for the right solutions to address their own challenges.

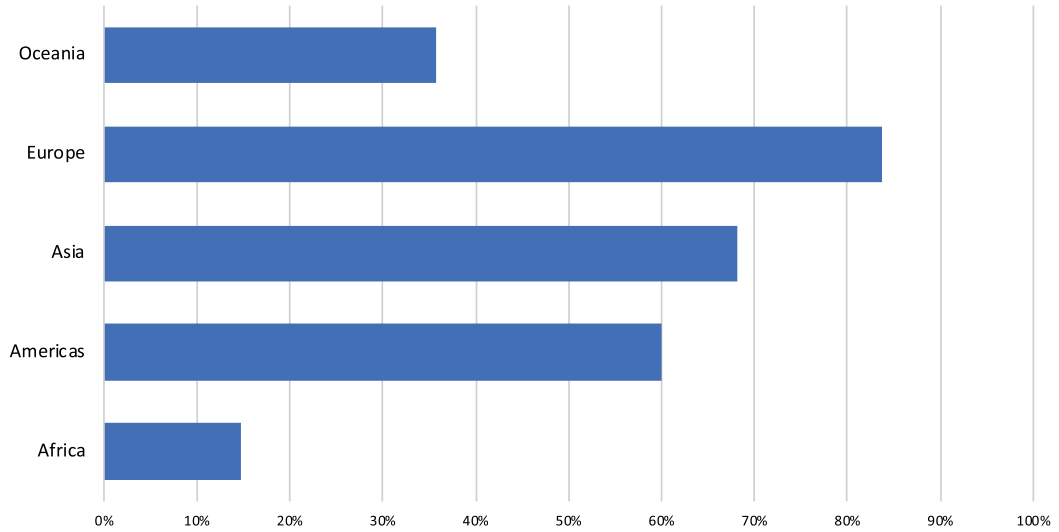
E-Participation

Participation is a key dimension of governance and one of the pillars of sustainable development. The 2030 Agenda for Sustainable Development highlights the importance of participatory processes. Through the Survey, e-participation is assessed on the basis of features of national e-government portals and other government websites which relate to the provision of information to citizens; consultation; and decision-making.

The publication of information is almost universal, with more than 170 countries publishing some kind of information in each of the six sectors considered (health, education, employment, social protection, environment, and justice.). Many governments now offer a range of opportunities for e-participation beyond the provision of information. The "supply" of electronic consultations by governments has kept growing, with evidence of recent online consultations in more than 50 countries for each of the six sectors assessed. The extent of online consultations, however, differs widely across regions. The level of transparency of governments on how citizens' inputs are included in decision-making also varies.

Failure of e-participation initiatives can often be traced to a lack of clear objectives, failure to analyse stakeholders' motivations to engage, lack of analysis of costs and benefits, and lack of evaluation. Two decades of experience with e-participation have shown the critical importance of linking e-participation initiatives with formal institutional processes, in order for peole to see that participation has an impact. Within public organizations, the integration of e-participation

Percentage of countries with evidence of online consultations held in the past 12 months, by region, 2020



Source: 2020 United Nations E-Government Survey

Note: The figure reflects the proportion of countries in each region in which evidence was found of at least one e-consultation having been conducted in the past 12 months in the any of the following sectors: education, health, environment, social protection, labour or justice.

activities with regular tasks and processes, as opposed to their existence in silos, is also very important for changing administrative culture and mindset with regard to participation and make the latter sustainable over time; yet, this process of institutionalization remains poorly understood. Finally, citizen take-up and sustained use of e-participation depends in part on their trust in government institutions, but also on their trust of Internet in general and of specific components of participation platforms such as social media.

Key Messages: E-Participation

- While e-participation platforms have continued to spread in more countries, there is a trend towards multi-function participation platforms, such as ideation forums, consultations and/or e-petitions on new policies, opinion surveys, complaint system, reports of corruption and generation of ideas and innovations.
- Boundaries between public and private initiatives in e-participation have become blurrier, as both the private sector and not-for-profit organizations have built platforms for citizen action or user feedback.
- It is not always clear that the multiplication of electronic platforms has translated into broader or deeper participation. In many cases, the take-up of e-participation remains low. Beyond reasons related to technology access and digital skills, a lack of understanding of motivations to participate online and the reluctance of public institutions to share agenda setting and decision-making power seem to play an important role in the observed limited progress, among many other factors.

Towards data-centric e-government

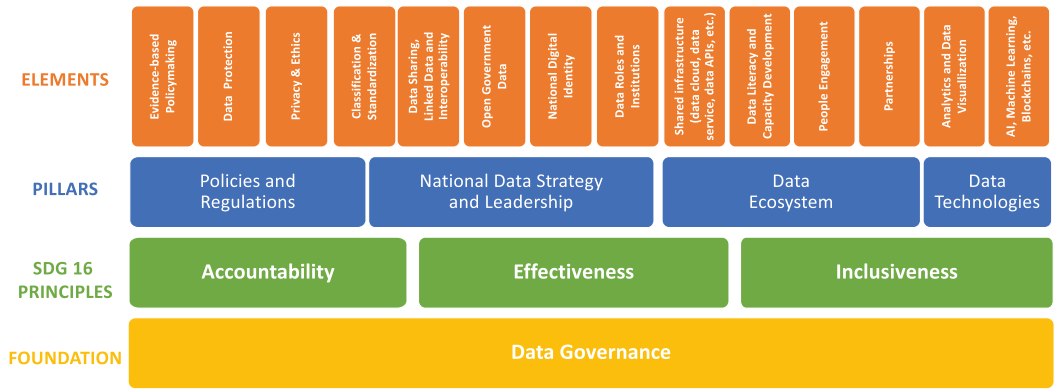
The need for government data is nothing new. For decades, the collection, utilization, exchange and security of government data have been of great interest to Governments and academics. The

ways in which data are created and used have changed dramatically in recent years, bolstered by the revolution in data technologies and the proliferation of applications of different types and forms of data, including small and big data, real-time data and geospatial data. Data are sometimes referred to as "oil" or "gold", reflecting the growing recognition that data represent the fuel or currency for e-government and even for government more generally. It is evident that data are now seen as a key resource and a strategic asset for Governments.

With the emerging trends in government data and the mounting risks and challenges, a paradigm shift is occurring that compels Governments to leverage data governance frameworks and data-centric e-government strategies to generate public value in innovative ways. The number of countries that have set up open government data (OGD) portals has increased markedly, rising from 46 in 2014 (24 per cent) to 153 in 2020 (80 per cent). There have also been increases in associated features; among the member States surveyed, 59 per cent have an OGD policy, 62 per cent have metadata or a data dictionary, 57 per cent accept public requests for new data, 52 per cent offer guidance on using OGD, and 49 per cent engage in promotional efforts such as data hackathons.

With the growing technological capacities to process ever-larger and more complex data sets that can provide policymakers with better insight and foresight and make e-services more efficient, accountable and inclusive, the potential and opportunities surrounding data abound, especially in the context of delivering on complex sustainable development targets. Shifting from "gut instinct" to data-centric policymaking is now a viable alternative and is rapidly moving towards becoming a strategic imperative.

Illustrative data governance framework for e-government



Source: Adapted from Doris Maharlika H. Dizon and others, "Data governance in fostering policy coherence and collaboration for cleaning the River Ganga", in *Ganga Rejuvenation: Governance Challenges and Policy Options*, Ora-orn Poocharoen, Robert James Wasson and Xun Wu, eds., pp. 297-335 (Singapore, World Scientific Publishing Co., 2016), available at https://www.worldscientific.com/worldscibooks/10.1142/9715#t=toc.

With the exponential increase in government data and the growing awareness of its enormous potential and attendant challenges and risks, the need for effective data governance and institutions has gained new urgency. Cybersecurity awareness, incident reporting frameworks and ongoing staff training are necessary for effective response to data breaches and cyberattacks. Data-centric policies around digital government should always be driven by well-defined policy and operational needs and clearly articulated public benefits.

Key messages: towards data-centric e-government

- Optimizing the use of government data will increase the productivity, accountability and inclusivity of public institutions, in line with the principles embodied in Goal 16 of the 2030 Agenda. A data-centric government will also help build trustworthiness and public trust.
- Many benefits around government data have yet to be realized, especially in countries in special situations. The greatest obstacles to progress include a general lack of understanding of data and data science, low political priority and the absence of data leadership, resource constraints, and concerns about data quality, security and privacy.
- Harvesting public value from data requires a long-term vision and approach that involves mastering the economics and politics of data governance and management and effectively navigating the evolving data security and privacy landscape. As data governance encompasses much more than technical funtionns, Governments must emply a holistic, whole-of-government approach in developing an overarching data governance framework supported by a national data strategy, strong data leadership and a data ecosystem.

Capacities for digital transformation

Governments around the world are using digital technologies to innovatively transform the way they operate, share information, make decisions and deliver services, as well as to engage and partner with people to solve policy challenges of public concern. However, many countries still lack the capacity to effectively leverage digital technologies to provide accessible, reliable, fast, personalized, secure and inclusive services and empower people through open and participatory mechanisms.

Developing multiple capacities for e-government development is essential, as digital government transformation involves far more than the integration of technology in governance. Fundamental changes in the mindsets of public servants and in the way public institutions collaborate are also critical. The 2020 Survey indicates that the countries at the most advanced levels of e-government development have assigned priority to developing capacities and mindsets that fully support an integrated, whole-of-government approach to digital government transformation.

Nine key pillars for digital government transformation

1. **Vision, leadership, mindsets:** Strengthen transformational leadership, changing mindsets and digital capacities at the individual level
2. **Institutional and regulatory framework:** Develop an integrated institutional ecosystem through a comprehensive legal and regulatory framework
3. **Organizational setup and culture:** Transform the organizational setup and culture
4. **System thinking and integration:** Promote systems thinking and development of integrated approaches to policymaking and service delivery
5. **Data governance:** Ensure strategic and professional management of data to enable data-driven policymaking and access to information through open government data, among other data access and use priorities.
6. **ICT Infrastructure, affordability and accessibility to technology**
7. **Resources:** Mobilize resources and align priorities, plans, and budgeting, including through public-private partnerships
8. **Capacity of capacity developers:** Enhance the capacity of schools of public administration and other institutions
9. **Societal capacities:** Develop capacities at the societal level to leave no one behind and bridge the digital divide

Countries with high or very high EGDI values have a common characteristic: their institutions have advanced a systems-thinking approach to policymaking and service delivery by using information and communications technology (ICT) to enhance operational linkages. While there is no blueprint for designing institutions that can promote the integration of processes and data among agencies and levels of government, a basic strategy followed by countries with high EGDI values has been to reorganize institutional and organizational structures to establish appropriate horizontal and vertical workflows before implementing an automation process.

Many countries have created or modified organizational structures to better support digital government transformation. Among the 193 United Nations Member States, 145 have a chief information officer or the equivalent. New organizational structures need to be complemented by changes in the government organizational culture at all levels and the development of new individual capacities in the public sector and society. Capacities to mobilize resources, manage data, promote effective public communication, and address issues relating to ICT infrastructure and affordability and access to technologies are part of a holistic approach as well. It is also necessary to develop the relevant capacities of capacity developers and of all people, including vulnerable groups.

Key messages: capacities for digital transformation

- Digital government transformation is fundamentally about governance transformation and cultural change in support of a country's overall national development vision and strategy and the achievement of the Sustainable Development Goals.
- Digital government transformation requires a holistic approach that is value-driven and institutionalized across all levels of government and society. It can be realized through a four-step iterative process that includes undertaking a context and situation analysis, articulating a shared vision of government transformation and how digital technologies will be leveraged to achieve societal goals, devising a strategy and a digital government implementation road map based on key pillars, and putting in place monitoring and evaluation mechanisms for continuous improvement.
- Digital government transformation should aim at promoting digital inclusion and ensuring that all people, including vulnerable groups, can access new technologies to improve their well-being. It should put people first and revolve around their needs.

The role of digital government in the COVID-19 pandemic

During the COVID-19 crisis, ICT has played a vital role in promoting the health and safety of people and in keeping economies and societies working. Digital government technologies, through information sharing and online services provision, have kept Governments and people connected during the outbreak. Digital technologies have also enabled Governments to make rapid policy decisions based on real-time data and analytics, to enhance the capacities of local authorities for better coordination, and to deploy evidence-based services to those who need them most.

Throughout the pandemic, Governments have shared information through their national portals, mobile apps, and social media platforms. A review of the national portals of the 193 United Nations Member States indicates that Governments have exhibited high levels of transparency when reporting and sharing crisis-related information. Some Governments have demonstrated great agility in developing dedicated COVID-19 portals and government-supported apps to provide continually updated information and resources. A number of Governments must be

highly commended for rapidly developing and deploying innovative online services designed to contribute to the fight against COVID-19.

Government partnerships with the private sector in the implementation of new technology applications have been shown to have a positive effect on the fight against the outbreak. In such contexts, it is necessary to have the appropriate legal and institutional structures in place to address the potential breaches of privacy and human rights concerns that their implementation might entail. Policymakers need to abide by the principle of data minimization and limited data collection, retaining and sharing only those personal data that are absolutely necessary and can justifiably be linked to the efforts to overcome the health crisis so that there is no question of surveillance misuse or the violation of data privacy.

Key messages: digital government and the COVID-19 pandemic

- Digital government has played a central role in addressing the crisis, becoming an essential element of communication, leadership and collaboration between policymakers and society during the COVID-19 pandemic.
- Governments need to give careful consideration to the unintended consequences of technology use and take active steps to protect sensitive data and people's privacy and security.
- The pandemic has shown how critical ICT can be when appropriately leveraged for good governance, especially in difficult times. Governments need to accelerate efforts to embrace technology, even when the crisis is over.

The way forward

Digital government is not an end; it is a means to improving public service delivery, increasing people's engagement, enhancing transparency, accountability and inclusion, and ultimately making life better for all. As United Nations Secretary-General António Guterres recently noted, the post-COVID-19 world will be different and much more digital than before.[6] E-government has an increasingly important role to play in supporting countries as they endeavour to activate the Decade of Action and accelerate the achievement of the Sustainable Development Goals. Governments will need to engage with stakeholders, including technology leaders and small and medium-sized enterprises, through effective partnerships. The way forward is a new "digital normal" in responding to global challenges and pursuing sustainable development.

Endnotes

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3 Organization for Economic Cooperation and Development, Public Governance and Territorial Development Directorate, *Recommendation of the Council on Digital Government Strategies* (2014), available at http://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf.

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1. Global Trends in E-Government

1.1 Introduction

In the Decade of Action for the implementation of the 2030 Agenda for Sustainable Development, science, technology and innovation hold the potential to break through some of the most complex challenges facing the world today. Digitalization in the public sector provides opportunities to support the achievement of the 2030 Agenda and the Sustainable Development Goals (SDGs), including by enhancing the efficiency and effectiveness of public service delivery and by reaching those left behind. Indeed, recent experience suggests that deploying e-government in support of good governance generally is essential for building effective, accountable and inclusive institutions at all levels, as called for in Goal 16, and for strengthening the implementation of Goal 17. To capitalize on the power of modern technologies, growing numbers of United Nations Member States are accelerating the digital transformation of governance and public administration.

This chapter presents a data-driven analysis of key trends in e-government development in 2020 based on the assessment of the E-Government Development Index (EGDI). It also describes and analyses global trends in electronic and mobile service delivery and sheds light on the distribution of online services based on country income levels and on the provision of services in specific sectors that are particularly important for sustainable development.

The chapter begins with a brief presentation of the e-government rankings of 193 United Nations Member States and their placement and relative position within four EGDI value groups (very high, high, middle and low). In 2020, for the first time, the ranking is supplemented by the rating class—further analysis of countries grouped according to four equally defined intervals (quartiles) within every value group to gain better insight into countries with similar levels of performance in each of the EGDI groups.

The analysis focuses on the major factors contributing to EGDI levels, such as progress in online transactional services delivery, trends in the provision of mobile services, and regional-level transformations in e-government development. Linkages to the SDGs are highlighted, including those relating to key priorities such as health, education, social protection, decent work, and justice for all.

1.2 E-government rankings in 2020

The first United Nations E-Government Survey was published in 2001. The 2020 Survey is the eleventh edition of a biennial publication dedicated to tracking the global development of e-government in all United Nations

Photo credit: pixabay.com

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Member States. Recent trends in e-government development are presented based on the assessment of values reflected in the EGDI, a normalized composite index with three components: the Online Services Index (OSI), the Telecommunications Infrastructure Index (TII) and the Human Capacity Index (HCI). Each of these indices by itself is a composite measure that can be extracted and analysed independently. The composite value of each component index is normalized to fall within the range of 0 to 1, and the overall EGDI is derived from taking the arithmetic average of the three component indices.

This biennial assessment of e-government development as reflected in the EGDI allows Member States to follow up on the Survey results and initiate improvements after each measurement. For each edition of the Survey, the EGDI has been subject to constructive improvements in the methodology to take into account the lessons learned from previous editions, the inputs and feedback received from the Member States, the recommendations of external evaluations, the outcomes of expert group meetings, and the advancement of the latest technological and policy developments in digital government. The changes introduced for the 2020 Survey, while limited, may nonetheless impede full-scale comparisons with the previous editions, though for the majority of indicators this remains possible, and historical comparisons are provided where relevant.

This report reviews the recent progress made by Member States in e-government development. A country's relative position in the e-government development rankings may fluctuate over time owing to global changes and to changes to the rankings of other countries in the same field. While individual country performance still matters, it might be more useful to interpret the values and rankings based on the movement of countries between the four EGDI groups and to evaluate a Member State's individual performance based upon its rating class (quartile position) within its EGDI group. For instance, the number of countries with very high EGDI values has increased from 40 in 2018 to 57 in 2020, making the values within the group quite close and comparable, especially within the highest rating class of that EGDI group.

The sections below present the 2020 Survey findings by EGDI rankings at the global level. Where relevant, additional insights are provided based on comparisons of data from the 2016 and 2018 Surveys and on relevant correlations between the EGDI and its components, country income group classifications, advancements in e-service provision, and trends in electronic and mobile service delivery in various sectors, as well as the differences in e-government advancement among vulnerable groups such as older people, women, youth, persons with disabilities and migrants. Where warranted, the Survey highlights similarities and differences not only between the EGDI groups, but also within specific rating classes.

1.3 E-government development at a glance

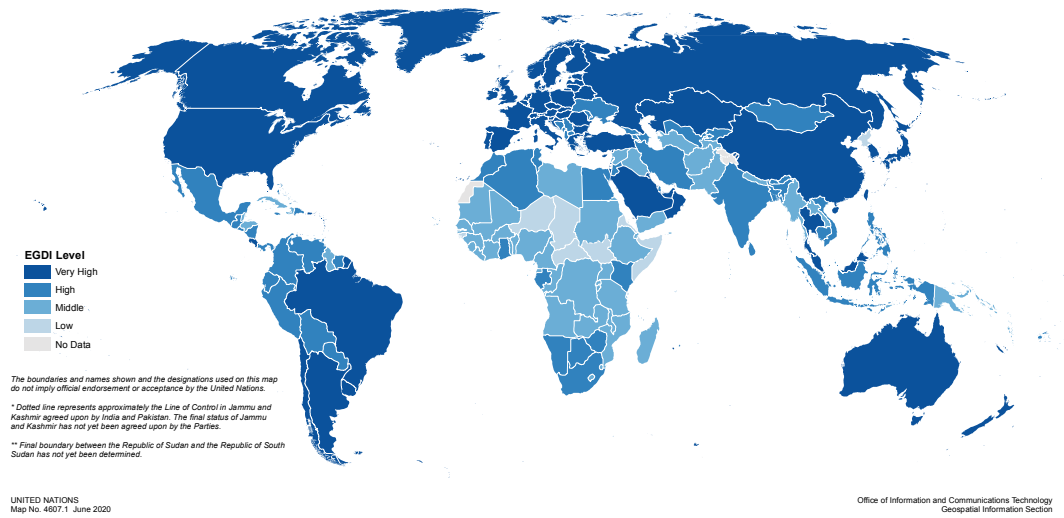
The 2020 Survey reflects further improvement in global trends in e-government development and the transitioning of many countries from lower to higher EGDI levels. In this edition, 57 countries have very high EGDI values ranging from 0.75 to 1.00, in comparison with 40 countries in 2018—a 43 per cent increase for this group. A total of 69 countries have high EGDI values of 0.50 to 0.75, and 59 countries are part of the middle EGDI group with values of between 0.25 and 0.50. Only eight countries have low EGDI values (0.00 to 0.25), which represents a 50 per cent reduction in the number of countries in this category in 2018.[1]

The map in figure 1.1 shows the geographical distribution of the four EGDI groups in 2020.

Figure 1.2 shows the respective numbers and percentages of countries in different EGDI groups in 2018 and 2020 for comparative purposes. The results for 2020 indicate that Member States with

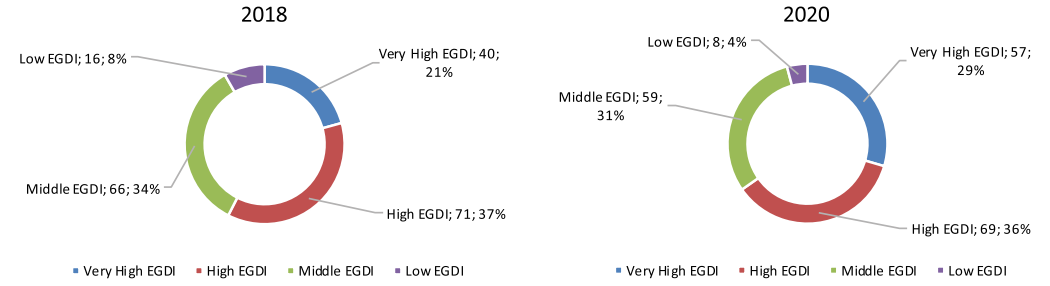
high EGDI values make up the largest share (36 per cent), followed by those with middle EGDI values (31 per cent). The proportion of countries with very high EGDI values has grown from 21 per cent in 2018 to 29 per cent in 2020, while the share of countries with low EGDI scores has declined from 8 to 4 per cent during the same period.

Figure 1.1 Geographical distribution of the four EGDI groups, 2020



Source: 2020 United Nations E-Government Survey.

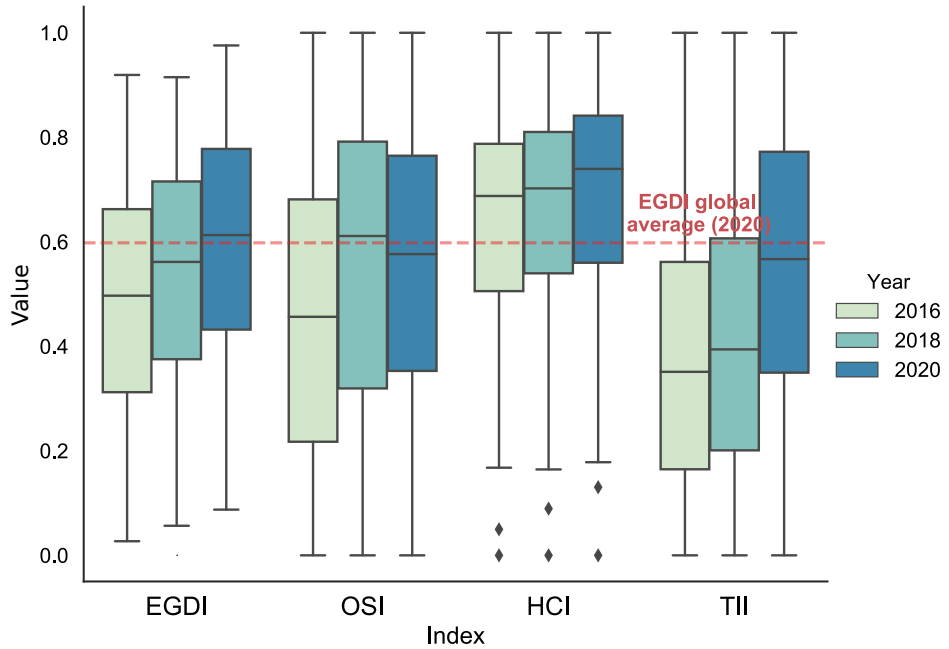
Figure 1.2 Number and proportion of countries within each EGDI grouping, 2018 and 2020



Source: 2020 United Nations E-Government Survey.

The global average EGDI value continues to rise, reaching 0.60 in 2020 in comparison with 0.55 in 2018 (see figure 1.3). Average HCI and OSI values are slightly higher than or comparable to 2018 averages, while those for the TII have improved significantly. It is important to note that while small changes in the HCI and OSI could be attributed (at least to some extent) to the updated survey methodology, the magnitude of the improvement in the TII subcomponents suggests an increase in infrastructure investments globally.

Figure 1.3 The average values for the EGDI and its component indices for 2016, 2018 and 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

1.3.1 Movement within and between EGDI groups

The 2020 Survey highlights a persistent positive global trend towards higher levels of e-government development. Figure 1.4 shows the number of countries that have moved from one EGDI group to another since 2018. Among the most important and positive changes reflected in the 2020 Survey is that 42 countries (or 22 per cent of Member States) recorded positive upward movement from a lower EGDI group to a higher one. Specifically, 18 countries moved from the high to the very high group, 16 moved from the middle to the high group, and eight moved from the low to the middle group.

With 34 new entrants to the high and very high EGDI groups in 2020, the percentage of countries with values between 0.50 and 1.00 has increased by 13.5 per cent since 2018; these 126 Member States now account for 65 per cent of the total. This denotes a significant improvement in the level of e-government development around the world.

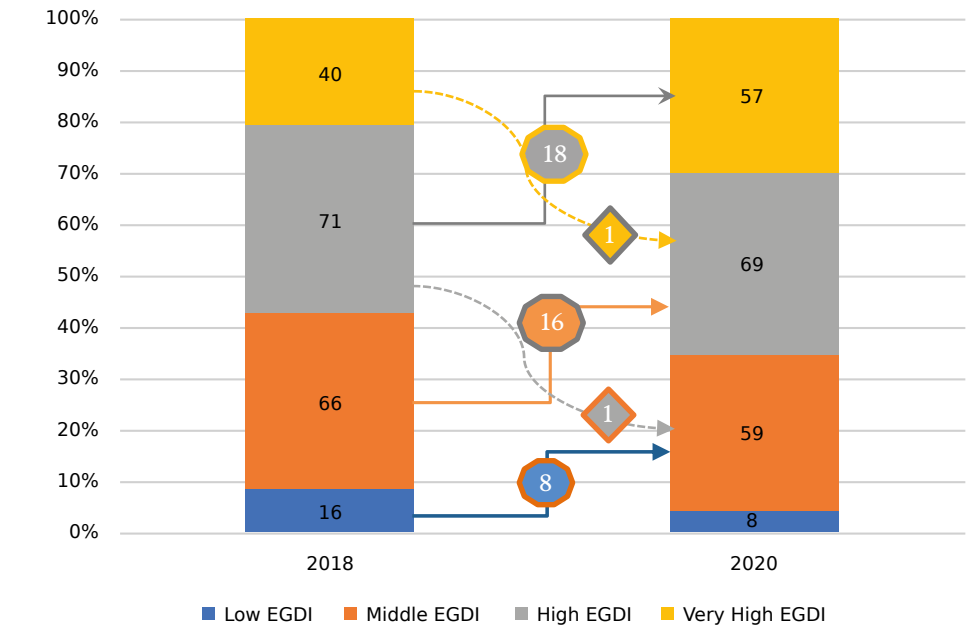
Only one country (Monaco) moved from the very high to the high EGDI group, and another (Lebanon) moved from the high to the middle group. However, these drops are more a reflection of methodological changes introduced in 2020 EGDI measurement than of country performance.[2]

In the 2020 Survey, each EGDI group is subdivided into four equally defined intervals, or quartiles,[3] named rating classes, to gain better insight into the situations of subgroups of countries with similar levels of performance (see table 1.1).

Table 1.1. Rating class breakdowns within EGDI groups

Low EGDI				Middle EGDI				High EGDI				Very High EGDI			
L1	L2	L3	LM	M1	M2	M3	MH	H1	H2	H3	HV	V1	V2	V3	VH

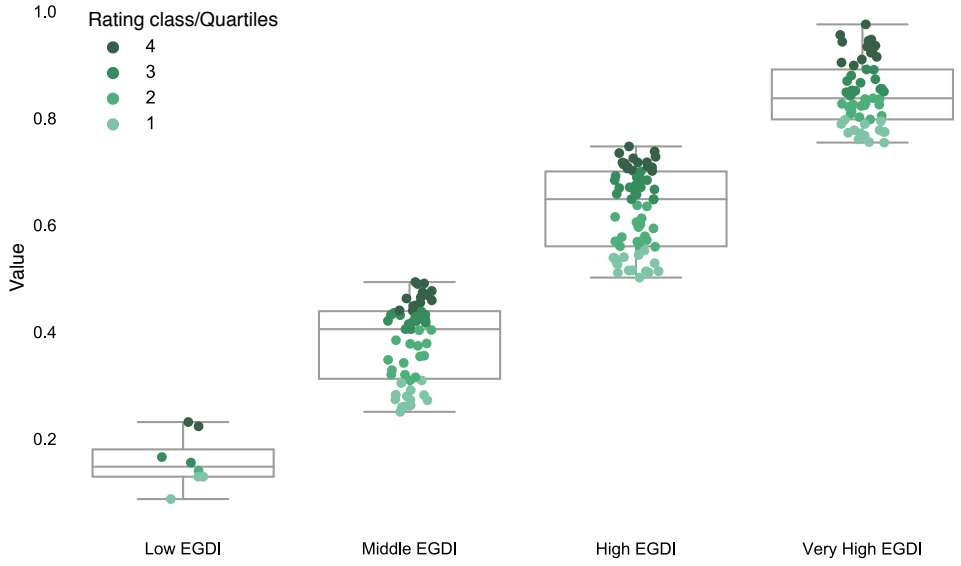
Figure 1.4 Movement between EGDI groups from 2018 to 2020 *(Number of countries)*



Source: 2018 and 2020 United Nations E-Government Surveys.

Table 1.2 shows the relative position of countries within the respective EGDI groups (very high, high, middle and low) and their rating class designations. The table also indicates whether a country moved from one EGDI group to another between 2018 and 2020. Figure 1.5 offers a snapshot of the distribution of countries among EGDI groups and rating classes.

Figure 1.5 EGDI group breakdown based on rating class/quartiles



Source: 2020 United Nations E-Government Survey.

As evident from table 1.2, the lowest rating class in each EGDI group includes many countries that transitioned from a lower to a higher EGDI level between 2018 and 2020. All of the countries that

Table 1.2. Country EGDI groupings and rating classes within EGDI groups (from highest to lowest) in 2020 and movement between EGDI groups between 2018 and 2020

Very High EGDI 2020 *(Greater than 0.75)*	Rating Class	Movement within group	High EGDI 2020 *(Between 0.50 and 0.75)*	Rating Class	Movement within the group	Middle EGDI 2020 *(Between 0.25 to 0.50)*	Rating Class	Movement within the group	Low EGDI 2020 *(Less than 0.25)*	Rating Class	Movement within the group
Denmark	VH	none	Serbia	HV	none	Lebanon	MH	H to M	Guinea-Bissau	LM	None
Republic of Korea	VH	none	Albania	HV	none	Eswatini	MH	none	Democratic People's Republic of Korea	LM	None
Estonia	VH	none	Brunei Darussalam	HV	none	Guyana	MH	none	Niger	L3	None
Finland	VH	none	Mexico	HV	none	Rwanda	MH	none	Chad	L3	None
Australia	VH	none	Barbados	HV	none	Syrian Arab Republic	MH	none	Central African Republic	L2	None
Sweden	VH	none	Mauritius	HV	none	Nepal	MH	none	Somalia	L2	None
United Kingdom of Great Britain and Northern Ireland	VH	none	Monaco	HV	VH to H	Tajikistan	MH	none	Eritrea	L1	None
New Zealand	VH	none	Georgia	HV	none	Timor-Leste	MH	none	South Sudan	L1	None
United States of America	VH	none	Qatar	HV	none	Lesotho	MH	none			
Netherlands	VH	none	Colombia	HV	none	Belize	MH	none			
Singapore	VH	none	Armenia	HV	none	Uganda	MH	none			
Iceland	VH	none	Ukraine	HV	none	Honduras	MH	none			
Norway	VH	none	Azerbaijan	HV	none	Côte d'Ivoire	MH	none			
Japan	VH	none	Peru	HV	none	Cuba	MH	none			

Source: 2018 and 2020 United Nations E-Government Surveys.

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Austria	V3	none	North Macedonia	HV	none	Nigeria	MH	none			
Switzerland	V3	none	Bahamas	HV	none	Vanuatu	M3	none			
Spain	V3	none	Ecuador	HV	none	Iraq	M3	none			
Cyprus	V3	none	Montenegro	H3	none	Cameroon	M3	none			
France	V3	none	Seychelles	H3	none	Kiribati	M3	none			
Lithuania	V3	none	Philippines	H3	none	Myanmar	M3	none			
United Arab Emirates	V3	none	South Africa	H3	none	Togo	M3	none			
Malta	V3	none	Republic of Moldova	H3	none	Zambia	M3	none			
Slovenia	V3	none	Andorra	H3	none	Samoa	M3	none			
Poland	V3	none	Trinidad and Tobago	H3	none	Senegal	M3	none			
Germany	V3	none	Dominican Republic	H3	none	Tuvalu	M3	none			
Uruguay	V3	none	Kyrgyzstan	H3	none	United Republic of Tanzania	M3	none			
Ireland	V3	none	Panama	H3	none	Pakistan	M3	none			
Canada	V3	none	Sri Lanka	H3	none	Nauru	M3	none			
Kazakhstan	V3	none	Viet Nam	H3	none	Sao Tome and Principe	M3	none			
Israel	V2	none	Uzbekistan	H3	none	Marshall Islands	M3	none			
Liechtenstein	V2	none	Indonesia	H3	none	Benin	M2	none			
Argentina	V2	H to VH	Iran (Islamic Republic of)	H3	none	Turkmenistan	M2	none			
Luxembourg	V2	none	Fiji	H3	none	Angola	M2	none			
Chile	V2	H to VH	Tunisia	H3	none	Congo	M2	none			

Source: 2018 and 2020 United Nations E-Government Surveys.

Table 1.2. Country EGDI groupings and rating classes within EGDI groups (from highest to lowest) in 2020 and movement between EGDI groups between 2018 and 2020

Very High EGDI 2020 *(Greater than 0.75)*	Rating Class	Movement within group	High EGDI 2020 *(Between 0.50 and 0.75)*	Rating Class	Movement within the group	Middle EGDI 2020 *(Between 0.25 to 0.50)*	Rating Class	Movement within the group	Low EGDI 2020 *(Less than 0.25)*	Rating Class	Movement within the group
Portugal	V2	none	Mongolia	H3	none	Micronesia (Federated States of)	M2	none			
Russian Federation	V2	none	Paraguay	H2	none	Libya	M2	none			
Italy	V2	none	Bosnia and Herzegovina	H2	none	Mozambique	M2	none			
Bahrain	V2	none	Saint Kitts and Nevis	H2	none	Burkina Faso	M2	none			
Czech Republic	V2	H to VH	San Marino	H2	none	Malawi	M2	none			
Belarus	V2	none	Bolivia (Plurinational State of)	H2	none	Solomon Islands	M2	none			
Belgium	V2	none	Antigua and Barbuda	H2	none	Lao People's Democratic Republic	M2	none			
Greece	V2	none	Dominica	H2	none	Burundi	M2	none			
Saudi Arabia	V2	H to VH	India	H2	none	Afghanistan	M2	none			
Bulgaria	V1	H to VH	Ghana	H2	none	Sudan	M2	L to M			
China	V1	H to VH	Grenada	H2	none	Mali	M2	L to M			
Kuwait	V1	H to VH	Bhutan	H2	M to H	Madagascar	M1	none			
Malaysia	V1	H to VH	Namibia	H2	M to H	Yemen	M1	L to M			
Slovakia	V1	H to VH	Maldives	H2	none	Sierra Leone	M1	none			
Latvia	V1	H to VH	Morocco	H2	none	Papua New Guinea	M1	none			
Oman	V1	H to VH	El Salvador	H2	none	Mauritania	M1	L to M			
Croatia	V1	H to VH	Tonga	H2	none	Comoros	M1	L to M			
Hungary	V1	H to VH	Saint Vincent and the Grenadines	H2	none	Ethiopia	M1	none			

Source: 2018 and 2020 United Nations E-Government Surveys.

Table 1.2. Country EGDI groupings and rating classes within EGDI groups (from highest to lowest) in 2020 and movement between EGDI groups between 2018 and 2020

Very High EGDI 2020 *(Greater than 0.75)*	Rating Class	Movement within group	High EGDI 2020 *(Between 0.50 and 0.75)*	Rating Class	Movement within the group	Middle EGDI 2020 *(Between 0.25 to 0.50)*	Rating Class	Movement within the group	Low EGDI 2020 *(Less than 0.25)*	Rating Class	Movement within the group
Turkey	V1	H to VH	Cabo Verde	H2	M to H	Djibouti	M1	L to M			
Brazil	V1	H to VH	Egypt	H1	M to H	Haiti	M1	none			
Romania	V1	H to VH	Saint Lucia	H1	M to H	Gambia (Republic of The)	M1	none			
Costa Rica	V1	H to VH	Gabon	H1	M to H	Liberia	M1	none			
Thailand	V1	H to VH	Jamaica	H1	M to H	Guinea	M1	L to M			
			Botswana	H1	M to H	Democratic Republic of the Congo	M1	none			
			Kenya	H1	M to H	Equatorial Guinea	M1	L to M			
			Jordan	H1	none						
			Venezuela, Bolivarian Republic of	H1	none						
			Bangladesh	H1	M to H						
			Algeria	H1	M to H						
			Guatemala	H1	M to H						
			Suriname	H1	M to H						
			Nicaragua	H1	M to H						
			Cambodia	H1	M to H						
			Palau	H1	none						
			Zimbabwe	H1	M to H						

Source: 2018 and 2020 United Nations E-Government Surveys.

moved up from the high to the very high EGDI group have a rating class of V1 or V2 (the two lowest rating classes of the very high EGDI group). Similarly, 13 of the 16 countries in the H1 rating class moved up from the middle to the high EGDI group.

The 14 countries in the highest (VH) rating class within the very high EGDI group are the leading countries in terms of the 2020 Survey results, with values ranging between 0.8989 and 0.9758. Ranked from highest to lowest within the rating class, these countries include Denmark, Republic of Korea, Estonia, Finland, Australia, Sweden, United Kingdom of Great Britain and Northern Ireland (hereinafter referred to as the United Kingdom), New Zealand, United States of America (hereinafter referred to as the United States), Netherlands, Singapore, Iceland, Norway and Japan.

Very high and high EGDI groups

The number of United Nations Member States in the very high EGDI group (with values ranging from 0.75 to 1.00) increased from 40 to 57, representing a 43 per cent increase between 2018 and 2020. Among these 57 countries, 14 are in the VH rating class, 15 are in the V3 rating class, and the remaining 28 countries are equally distributed between the V2 and V1 rating classes.

Of the 18 countries ranked in the very high EGDI group for the first time, four are in the Americas (Argentina, Chile, Brazil and Costa Rica), seven are in Asia (Saudi Arabia, China, Kuwait, Malaysia, Oman, Turkey and Thailand), and seven are in Europe (Czech Republic, Bulgaria, Slovakia, Latvia, Croatia, Hungary and Romania). While 14 of these countries moved into the V1 rating class, Argentina, Chile, the Czech Republic and Saudi Arabia jumped directly into the V2 rating class. All 18 countries are high- or upper-middle-income economies.

The total number of countries in the high EGDI group rose only slightly, from 69 to 71, between 2018 and 2020. Half of the 16 countries that joined the high EGDI group in 2020 are in Africa (Namibia, Cabo Verde, Egypt, Gabon, Botswana, Kenya, Algeria and Zimbabwe), five are in the Americas (Saint Lucia, Jamaica, Guatemala, Suriname and Nicaragua), and three are in Asia (Bhutan, Bangladesh and Cambodia). Three countries—Bhutan, Namibia and Cabo Verde—registered significant improvement, reaching the H2 rating class within their EGDI group.

Eight of these 16 countries are in special situations and are classified by the United Nations as least developed countries (LDCs), landlocked developing countries (LLDCs) and/or small island developing States (SIDS); this signifies the possibility of progress in e-government development in countries with limited resources. The number of countries in special situations in the high and very high EGDI groups rose from 27 in 2018 to 35 in 2020; nine of the latter are lower-middle-income countries (Bangladesh, Bhutan, Plurinational State of Bolivia, Cabo Verde, Cambodia, Kyrgyzstan, Mongolia, Republic of Moldova and Uzbekistan). Groups of countries in special situations are further analysed in chapter 2.

At the regional level, all 43 European countries are in the high or very high EGDI group, and eight of them are among the leading countries in the VH rating class. The region next most represented in these two groups is the Americas, where 85 per cent of the countries rank high or very high, though only the United States is part of the highest (VH) rating class. The corresponding shares in other regions include 72 per cent for Asia, with the Republic of Korea, Singapore and Japan in the leading VH rating class; 36 per cent for Oceania, with Australia and New Zealand included in the VH rating class; and 26 per cent for Africa. Among the 14 African countries in the high EGDI group, only Mauritius is in the highest (HV) rating class.

Middle EGDI group

The number of countries in the middle EGDI group (with values ranging from 0.25 to 0.50) decreased from 66 in 2018 to 59 in 2020; this 11 per cent decline is positive, given that many countries moved up to the high EGDI group (see figure 1.4). Eight countries shifted from the low to the middle EGDI group during this period; seven are countries in Africa (Comoros, Djibouti, Equatorial Guinea, Guinea, Mali, Mauritania and Sudan), and one is in Asia (Yemen).

Africa has the largest share of countries in the middle EGDI group (56 per cent, or a total of 33 countries), followed by Asia (20 per cent, or 12 countries), Oceania (15 per cent, or 9 countries) and the Americas (9 per cent, or 5 countries).

The overwhelming majority of the countries in the middle EGDI group—48 out of 59, or 81 per cent—are countries in special situations (LDCs, LLDCs and/or SIDS). Among these 48 countries, 23 (57 per cent) are low-income economies (18 in Africa, 4 in Asia and 1 in the Americas), while 17 countries (or 35 per cent) are lower-middle-income economies (9 in Africa, 5 in Oceania and 3 in Asia). The remaining eight countries (4 in Oceania, 3 in the Americas and 1 in Asia) are upper-middle-income economies.

Low EGDI group

The number of countries with low EGDI values (below 0.25) has dropped by half, declining from 16 in 2018 to 8 in 2020. Seven of these eight countries are LDCs and/or LLDCs in Africa (Central African Republic, Chad, Eritrea, Guinea-Bissau, Niger, Somalia and South Sudan), and one country is an LDC in Asia (Democratic People's Republic of Korea).

During the past few years, Africa has made significant strides in e-government development, with only 7 of the region's 54 countries remaining in the low EGDI group. Nevertheless, the 2020 Survey findings confirm the persistence of digital divides within and between regions, in spite of the impressive progress made overall in e-government development globally. Regional trends and findings are presented in chapter 2.

1.4 The countries leading in e-government development

In reviewing and analysing the 2020 Survey results, it is important to bear in mind that the EGDI is a normalized relative index, and slight differences in EGDI values between countries do not necessarily imply that a country with a lower EGDI score has underperformed during the specific two-year Survey period. Nor does a higher EGDI value signify better performance, especially among countries within the same rating class. Hence, analysts and policymakers should be cautioned against misinterpreting slight changes in rankings among countries within the same rating class. Every country should determine the level and extent of its digital government objectives based on its specific national development context, capacity, strategy and programmes rather than on an arbitrary assumption of its future position in the ranking. The EGDI is a benchmarking tool for e-government development to be used as a proxy performance indicator.

The 14 countries in the highest (VH) rating class of the very high EGDI group are listed in table 1.3, which also provides the corresponding OSI, TII, HCI and overall EGDI values.

The United States, with its VH rating class and improved EGDI value, continues to play a leading role in e-government development in the Americas and globally.

Table 1.3 Leading countries in e-government development in 2020

Country	Rating class	Region	OSI value	HCI value	TII value	EGDI value (2020)	EGDI value (2018)
Denmark	VH	Europe	0.9706	0.9588	0.9979	0.9758	0.9150
Republic of Korea	VH	Asia	1.0000	0.8997	0.9684	0.9560	0.9010
Estonia	VH	Europe	0.9941	0.9266	0.9212	0.9473	0.8486
Finland	VH	Europe	0.9706	0.9549	0.9101	0.9452	0.8815
Australia	VH	Oceania	0.9471	1.0000	0.8825	0.9432	0.9053
Sweden	VH	Europe	0.9000	0.9471	0.9625	0.9365	0.8882
United Kingdom of Great Britain and Northern Ireland	VH	Europe	0.9588	0.9292	0.9195	0.9358	0.8999
New Zealand	VH	Oceania	0.9294	0.9516	0.9207	0.9339	0.8806
United States of America	VH	Americas	0.9471	0.9239	0.9182	0.9297	0.8769
Netherlands	VH	Europe	0.9059	0.9349	0.9276	0.9228	0.8757
Singapore	VH	Asia	0.9647	0.8904	0.8899	0.9150	0.8812
Iceland	VH	Europe	0.7941	0.9525	0.9838	0.9101	0.8316
Norway	VH	Europe	0.8765	0.9392	0.9034	0.9064	0.8557
Japan	VH	Asia	0.9059	0.8684	0.9223	0.8989	0.8783

Source: 2020 United Nations E-Government Survey.

The Republic of Korea is the global leader in online services provision (OSI) and is the top EGDI performer in Asia, followed by Singapore and Japan.

Denmark has the highest EGDI value globally for the second consecutive Survey and is one of seven countries in Northern Europe and one of five countries in the European Union that are part of the highest (VH) rating class. The other European Union/Northern European countries in this category have registered improvements since the 2018 edition of the Survey. Estonia recorded the most significant EGDI increase, and Finland improved in all three subindices of the EGDI. Both Sweden and the United Kingdom achieved a higher overall EGDI value through substantial improvement in the technical infrastructure component (TII). The Netherlands is the final European Union member of the VH rating class. Iceland and Norway, both in Northern Europe and ranked twelfth and thirteenth overall, showed improvement in all three EGDI subindices.

Australia and New Zealand, the leaders in Oceania, remain in the very high EGDI group (in line with the past two editions of the Survey) and are well placed within the highest (VH) rating class.

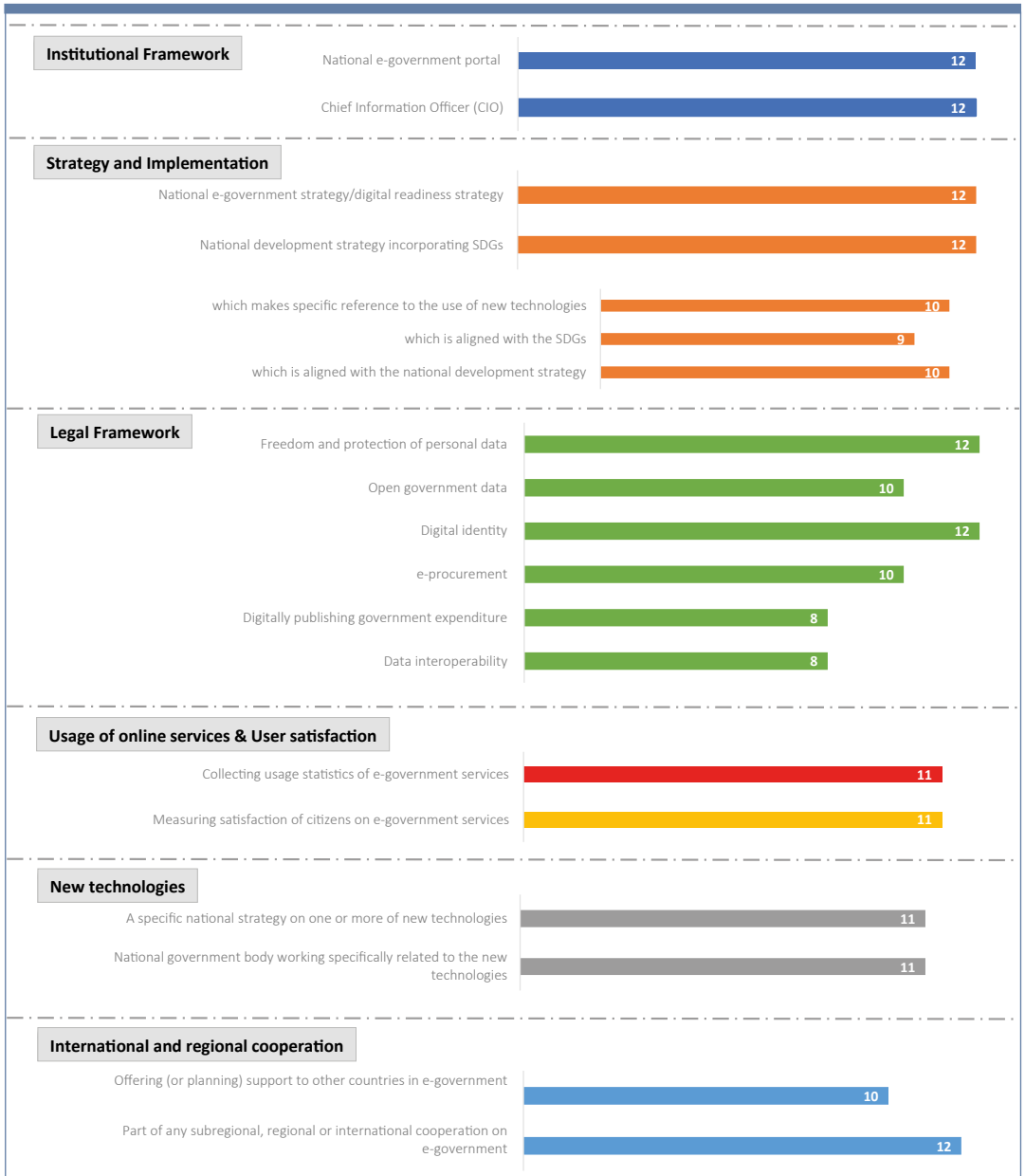
None of the countries in Africa are included in the VH rating class.

Below are the key findings resulting from a series of activities carried out by the United Nations E-Government Survey data team as part of the digital government assessment and review relating to the leading countries. The findings derive from EGDI disaggregated data analysis, a review of completed United Nations Member States Questionnaires (MSQs), and additional desk research complemented by literature review.

To integrate the information and the data analysis provided by the EGDI, an updated MSQ was launched in 2019 to gather additional detailed information about the efforts of public institutions in the realm of e-government development. The MSQ focused on strategic areas of digital policies aimed at developing effective, accountable and inclusive public institutions. It also sought information

on countries' institutional, legal and strategic frameworks. All the leading countries responded to the MSQ in 2019 (see figure 1.6), with the exception of the United States and Iceland, for which additional desk research was undertaken by the Survey data team.

Figure 1.6 Member States Questionnaires: key findings for 12 leading countries*



Source: 2020 Member States Questionnaires. *The United States and Iceland are not included.

The findings suggest that all countries in the VH rating class demonstrated consistency and progress in their strategic digital policy areas and in the coordination and implementation of their digital public services. For these countries, the whole-of-government approach has been strongly institutionalized and accompanied by data-driven public policies and by services from various central and local public institutions and agencies bundled together in a national e-government portal. Governments have placed the citizens at the centre of multi-agency, multi-jurisdictional interactions. There is a trend towards providing a one-stop shop through specialized citizen-centric e-portals (focusing on e-participation, open government and public procurement, for example) as single points of contact

where people and companies can access information, collect data, request documents, engage in transactional services, perform legal obligations, and be involved in more participatory governance through the use of the Internet and digital technologies. In addition, users have the possibility of customizing their own integrated electronic portfolio of services based on their individual preferences.

As emphasized in the 2016 Survey, integrated policies and whole-of-government approaches allow Governments to pursue sustainable development more effectively, as they take into account the interrelationships between sectors and subsectors and the economic, social and environmental dimensions of development addressed by the Goals and targets of the 2030 Agenda. The 2020 Survey data indicate that all 14 countries in the VH rating class have a national development strategy that incorporates SDG objectives. They also have a central agency, department or ministry in charge of a multi-year digital agenda led by a chief information officer (CIO) and supported by implementation plans for different policy areas.

Among the 12 leading countries that responded to the MSQ, 10 have a digital agenda aligned with their national development strategies, 9 report alignment with the SDGs, and 10 make specific reference to the use of frontier technologies such as artificial intelligence, blockchain and big data.

All countries in the VH rating class have a comprehensive legal and regulatory framework for digital government that establishes rules, regulations, standards and guidelines relating to digital identity, online information and personal data. These include but are not limited to legislation on access, safety and security, freedom of information and data protection (see chapter 5 for a more detailed explanation). The MSQs reveal that the majority of countries in this group have adopted a legal framework for open government data (OGD) to regulate government data sharing in open and machine-readable formats within the framework of data protection and privacy legislation. All have modernized public services delivery, procurement processes and contracting arrangements, making them digital by design. This allows the countries to offer public services compatible with modern and agile ways of developing and deploying digital technology in line with the principles of effectiveness, efficiency, transparency, accountability and public trust. Eight countries have also adopted rules and procedures for digitally publishing government expenditures and have introduced interoperability to enhance the use of open source solutions and open standards when building public services.

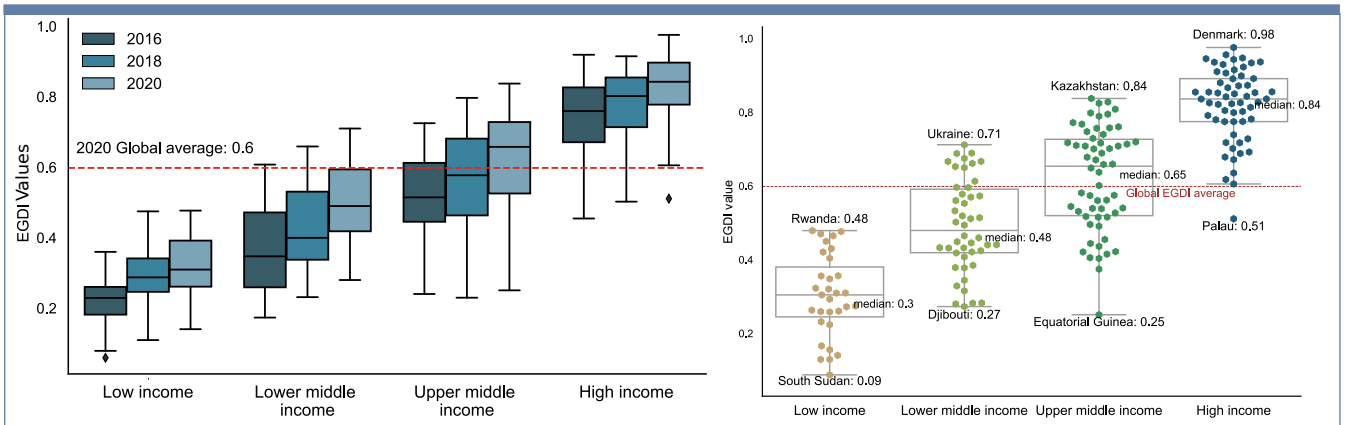
Further, 11 of the leading countries have a specific national strategy for new technologies such as artificial intelligence, deep machine learning and blockchain and have established a mechanism at the national level (an agency, project or pilot initiative) to fully exploit the potential of those technologies when formulating policies and designing services. These Governments have begun to rethink and re-engineer internal processes and simplify procedures in order to reach out to the public more effectively. They tend to anticipate the services provision needs of users even before the services are requested. These Governments proactively seek feedback from people about the quality of services, collect usage statistics on e-government services, publish results online, share statistics with the concerned public institutions, and enable citizens to access real-time information on public services.

1.5 National income and e-government development

The 2020 e-government assessment shows a generally positive relationship between income levels (as measured by gross domestic product per capita) and EGDI values. Higher-income countries tend to have higher EGDI values than do lower-income countries. Given the technological advancements in higher-income countries, this trend is in line with the findings of all previous Surveys. However, there is strong movement towards higher EGDI values for countries in all income groups. Since 2018, lower-middle-income countries have improved their average EGDI values by more than 15 per cent,

upper-middle-income and low-income countries by 10 per cent, and high-income economies by 5 per cent (see the left graph of figure 1.7).

Figure 1.7 EGDI rankings by income group, 2020



Source: 2020 United Nations E-Government Survey.

Most low-income countries have EGDI values below the global average of 0.60, though there are exceptions (see the right graph of figure 1.7). Despite being LDCs and/or LLDCs with poorly developed infrastructure, Rwanda, Uganda and the United Republic of Tanzania—with respective OSI values of 0.6176, 0.5824 and 0.5529—offer online services at levels that are above the average. At the same time, Palau, a high-income small island developing State with highly developed human capital (reflected in an HCI value of 0.8816), has a weak infrastructure (TII value: 0.3745) and offers limited online services (OSI value: 0.2765).

Among the lower-middle-income countries, 22 per cent have EGDI values above the global average, and among the upper-middle-income countries the corresponding proportion is 56 per cent. Almost all of the high-income countries (98 per cent) have EGDI values above the global average.

1.6 Progress in online services delivery

The OSI component of the EGDI is a composite indicator measuring the use of information and communications technology (ICT) by Governments for the delivery of public services at the national level. OSI values are based on the results of a comprehensive survey covering multiple aspects of the online presence of all 193 Member States. The survey assesses the technical features of national websites, as well as e-government policies and strategies applied in general and by special sectors in delivering services. The results are tabulated and presented as a set of standardized index values on a scale of 0 to 1, with 1 corresponding to the highest-rated online services provision and 0 to the lowest. OSI values, like EGDI values, are not intended as absolute measurements; rather, they capture the online performance of countries relative to each other at a particular point in time. Because the OSI is a composite tool, a high score is an indication of current best practices rather than perfection. Similarly, a lower score, or a score that has not changed since the Survey's last edition, does not mean there has been no progress in e-government development.

Table 1.4 groups the 193 United Nations Member States according to OSI level and also provides a corresponding EGDI level for each country. There is a positive correlation between progress in online services provision and overall improvement in e-government development (as reflected in OSI and EGDI values).

Table 1.4 Country groupings by Online Services Index (OSI) level, 2020

Very High OSI			High OSI			Middle OSI			Low OSI		
Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level
Republic of Korea	1.0000	Very High EGDI	Israel	0.7471	Very High EGDI	Nicaragua	0.5471	High EGDI	Sao Tome and Principe	0.2471	Middle EGDI
Estonia	0.9941	Very High EGDI	Hungary	0.7471	Very High EGDI	Montenegro	0.5412	High EGDI	Liberia	0.2471	Middle EGDI
Denmark	0.9706	Very High EGDI	South Africa	0.7471	High EGDI	Syrian Arab Republic	0.5412	Middle EGDI	Papua New Guinea	0.2235	Middle EGDI
Finland	0.9706	Very High EGDI	North Macedonia	0.7412	High EGDI	Bosnia and Herzegovina	0.5353	High EGDI	Djibouti	0.2235	Middle EGDI
Singapore	0.9647	Very High EGDI	Germany	0.7353	Very High EGDI	Mongolia	0.5294	High EGDI	Guinea	0.2176	Middle EGDI
United Kingdom of Great Britain and Northern Ireland	0.9588	Very High EGDI	Philippines	0.7294	High EGDI	Namibia	0.5235	High EGDI	Chad	0.2000	Low EGDI
Australia	0.9471	Very High EGDI	Czech Republic	0.7235	Very High EGDI	Morocco	0.5235	High EGDI	Lao People's Democratic Republic	0.1941	Middle EGDI
United States of America	0.9471	Very High EGDI	Romania	0.7235	Very High EGDI	Zimbabwe	0.5235	High EGDI	Haiti	0.1882	Middle EGDI
Austria	0.9471	Very High EGDI	Slovakia	0.7176	Very High EGDI	Nigeria	0.5176	Middle EGDI	Turkmenistan	0.1765	Middle EGDI
New Zealand	0.9294	Very High EGDI	Sri Lanka	0.7176	High EGDI	Mozambique	0.5176	Middle EGDI	Nauru	0.1706	Middle EGDI
Kazakhstan	0.9235	Very High EGDI	Belarus	0.7059	Very High EGDI	Guatemala	0.5118	High EGDI	Democratic Republic of the Congo	0.1294	Middle EGDI
Netherlands	0.9059	Very High EGDI	Greece	0.7059	Very High EGDI	Benin	0.5118	Middle EGDI	Central African Republic	0.1294	Low EGDI
Japan	0.9059	Very High EGDI	Azerbaijan	0.7059	High EGDI	Fiji	0.5059	High EGDI	Comoros	0.1235	Middle EGDI
China	0.9059	Very High EGDI	Paraguay	0.7059	High EGDI	Cabo Verde	0.5000	High EGDI	Mauritania	0.1000	Middle EGDI
Sweden	0.9000	Very High EGDI	Mauritius	0.7000	High EGDI	Togo	0.5000	Middle EGDI	Equatorial Guinea	0.0647	Middle EGDI

Source: 2020 United Nations E-Government Survey.

Table 1.4 Country groupings by Online Services Index (OSI) level, 2020

Very High OSI			High OSI			Middle OSI			Low OSI		
Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level
United Arab Emirates	0.9000	Very High EGDI	Armenia	0.7000	High EGDI	Kiribati	0.4941	Middle EGDI	Guinea-Bissau	0.0647	Low EGDI
Spain	0.8882	Very High EGDI	Saudi Arabia	0.6882	Very High EGDI	Senegal	0.4941	Middle EGDI	Libya	0.0412	Middle EGDI
France	0.8824	Very High EGDI	Costa Rica	0.6824	Very High EGDI	Eswatini	0.4882	Middle EGDI	Gambia (Republic of The)	0.0294	Middle EGDI
Norway	0.8765	Very High EGDI	Ukraine	0.6824	High EGDI	Angola	0.4882	Middle EGDI	Democratic People's Republic of Korea	0.0176	Low EGDI
Cyprus	0.8706	Very High EGDI	Indonesia	0.6824	High EGDI	Andorra	0.4824	High EGDI	Eritrea	0.0118	Low EGDI
Brazil	0.8706	Very High EGDI	Bhutan	0.6824	High EGDI	Monaco	0.4706	High EGDI	South Sudan	0.0000	Low EGDI
Poland	0.8588	Very High EGDI	Bahamas	0.6765	High EGDI	Saint Vincent and the Grenadines	0.4706	High EGDI			
Turkey	0.8588	Very High EGDI	Kenya	0.6765	High EGDI	Cameroon	0.4706	Middle EGDI			
Lithuania	0.8529	Very High EGDI	Liechtenstein	0.6588	Very High EGDI	Guyana	0.4647	Middle EGDI			
Slovenia	0.8529	Very High EGDI	Belgium	0.6588	Very High EGDI	Honduras	0.4647	Middle EGDI			
Chile	0.8529	Very High EGDI	Qatar	0.6588	High EGDI	Burkina Faso	0.4647	Middle EGDI			
Malaysia	0.8529	Very High EGDI	Viet Nam	0.6529	High EGDI	Cambodia	0.4529	High EGDI			
Oman	0.8529	Very High EGDI	Kyrgyzstan	0.6471	High EGDI	Côte d'Ivoire	0.4529	Middle EGDI			
India	0.8529	High EGDI	Brunei Darussalam	0.6353	High EGDI	Antigua and Barbuda	0.4471	High EGDI			
Argentina	0.8471	Very High EGDI	Ghana	0.6353	High EGDI	Dominica	0.4471	High EGDI			
Uruguay	0.8412	Very High EGDI	Pakistan	0.6294	Middle EGDI	Timor-Leste	0.4412	Middle EGDI			
Canada	0.8412	Very High EGDI	Panama	0.6235	High EGDI	Maldives	0.4353	High EGDI			
Kuwait	0.8412	Very High EGDI	Tunisia	0.6235	High EGDI	Malawi	0.4235	Middle EGDI			
Albania	0.8412	High EGDI	Seychelles	0.6176	High EGDI	Lebanon	0.4176	Middle EGDI			
Portugal	0.8353	Very High EGDI	Rwanda	0.6176	Middle EGDI	Afghanistan	0.4118	Middle EGDI			

Source: 2020 United Nations E-Government Survey.

Table 1.4 Country groupings by Online Services Index (OSI) level, 2020

Very High OSI			High OSI			Middle OSI			Low OSI		
Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level
Switzerland	0.8294	Very High EGDI	Trinidad and Tobago	0.6118	High EGDI	Nepal	0.4000	Middle EGDI			
Italy	0.8294	Very High EGDI	Bangladesh	0.6118	High EGDI	Saint Kitts and Nevis	0.3941	High EGDI			
Mexico	0.8235	High EGDI	Georgia	0.5882	High EGDI	Jamaica	0.3882	High EGDI			
Russian Federation	0.8176	Very High EGDI	Iran (Islamic Republic of)	0.5882	High EGDI	Saint Lucia	0.3824	High EGDI			
Malta	0.8118	Very High EGDI	Latvia	0.5824	Very High EGDI	Tonga	0.3765	High EGDI			
Ecuador	0.8118	High EGDI	Bolivia (Plurinational State of)	0.5824	High EGDI	Botswana	0.3647	High EGDI			
Iceland	0.7941	Very High EGDI	Uganda	0.5824	Middle EGDI	Ethiopia	0.3647	Middle EGDI			
Thailand	0.7941	Very High EGDI	Barbados	0.5765	High EGDI	Jordan	0.3588	High EGDI			
Serbia	0.7941	High EGDI	El Salvador	0.5765	High EGDI	Lesotho	0.3529	Middle EGDI			
Bahrain	0.7882	Very High EGDI	Egypt	0.5706	High EGDI	Micronesia (Federated States of)	0.3529	Middle EGDI			
Uzbekistan	0.7824	High EGDI	United Republic of Tanzania	0.5529	Middle EGDI	Burundi	0.3529	Middle EGDI			
Ireland	0.7706	Very High EGDI				Mali	0.3471	Middle EGDI			
Bulgaria	0.7706	Very High EGDI				Grenada	0.3412	High EGDI			
Luxembourg	0.7647	Very High EGDI				Marshall Islands	0.3412	Middle EGDI			
Colombia	0.7647	High EGDI				Vanuatu	0.3353	Middle EGDI			
Dominican Republic	0.7647	High EGDI				Iraq	0.3353	Middle EGDI			
Croatia	0.7529	Very High EGDI				Gabon	0.3235	High EGDI			
Peru	0.7529	High EGDI				Solomon Islands	0.3235	Middle EGDI			

Source: 2020 United Nations E-Government Survey.

Table 1.4 Country groupings by Online Services Index (OSI) level, 2020

Very High OSI			High OSI			Middle OSI			Low OSI		
Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level	Country	OSI 2020	Corresponding EGDI level
Republic of Moldova	0.7529	High EGDI				Yemen	0.3235	Middle EGDI			
						Venezuela, Bolivarian Republic of	0.3176	High EGDI			
						Tajikistan	0.3176	Middle EGDI			
						Congo	0.3176	Middle EGDI			
						Sudan	0.3059	Middle EGDI			
						Sierra Leone	0.3059	Middle EGDI			
						Tuvalu	0.3000	Middle EGDI			
						Niger	0.2941	Low EGDI			
						Somalia	0.2941	Low EGDI			
						Suriname	0.2882	High EGDI			
						Madagascar	0.2882	Middle EGDI			
						San Marino	0.2824	High EGDI			
						Algeria	0.2765	High EGDI			
						Palau	0.2765	High EGDI			
						Belize	0.2647	Middle EGDI			
						Samoa	0.2647	Middle EGDI			
						Cuba	0.2588	Middle EGDI			
						Myanmar	0.2588	Middle EGDI			
						Zambia	0.2588	Middle EGDI			

Source: 2020 United Nations E-Government Survey.

The 2020 Survey results show that OSI and EGDI levels coincide for 119 Member States (62 per cent); however, 74 countries have OSI levels that are higher or lower than their respective EGDI levels (see table 1.5), suggesting that their online services provision is at a more or less advanced stage than the development of their telecommunications infrastructure and/or human capacity (as reflected in TII and HCI values and levels). The annex provides a snapshot of divergences in OSI levels from respective HCI and TII levels for all 193 United Nations Member States.

Table 1.5 Convergence and divergence of OSI levels relative to EGDI levels, 2020

Total number of Member States	193	Very High EGDI		High EGDI		Middle EGDI		Low EGDI	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Very High OSI	54	44	81	10	19	-	-	-	-
High OSI	46	13	28	29	63	4	9	-	-
Middle OSI	72	-	-	30	42	40	56	2	3
Low OSI	21	-	-	-	-	15	71	6	29

Source: 2020 United Nations E-Government Survey.

The implications for improvement in e-government overall (expressed in EGDI values) for countries with divergences may differ from a policymaking perspective, which is addressed in the analysis of key divergences below.

Countries with OSI levels that are higher than their respective TII and HCI levels are relatively well situated in terms of online services provision and are in a good position to progress fairly rapidly in e-government development if infrastructure and human capital development permit. For this group of countries, online services provision should be coupled with investments in improving the telecommunications infrastructure and/or strengthening digital literacy.

Very high OSI group

Among the 54 countries with very high OSI values (ranging from 0.75 to 1.00), 34 have similarly high TII and HCI values. The remaining 20 countries have combinations of TII and HCI levels that diverge in some way from their respective OSI levels (see table 1.6).

Table 1.6 TII and HCI subcomponent convergence and divergence for the very high OSI group, 2020

Very High OSI			
Very High HCI + High TII	Very High TII + High HCI	High TII + High HCI	High HCI + Middle TII
Albania, Argentina, Brazil, Colombia, Croatia, Ecuador, Kazakhstan, Mexico, Oman, Peru, Serbia, Thailand, Turkey	Kuwait, United Arab Emirates	China, Dominican Republic, Republic of Moldova	India, Uzbekistan

Source: 2020 United Nations E-Government Survey.

Kuwait and the United Arab Emirates have a highly developed infrastructure, but overall e-government development is hampered by relatively lower levels of human capital development (HCI values are 0.7470 and 0.7320, respectively).

Thirteen countries (Albania, Argentina, Brazil, Colombia, Croatia, Ecuador, Kazakhstan, Mexico, Oman, Peru, Serbia, Thailand and Turkey) have highly developed human capital, but the state of

their infrastructure may be impeding further progress in e-government development. China, the Dominican Republic and Moldova need to support their very high level of OSI development with investments in both human capital and infrastructure development.

It is important to note that online services delivery in India and Uzbekistan have improved significantly in spite of moderate infrastructure development (TII values are 0.3513 for India and 0.4736 for Uzbekistan). Both are lower-middle-income countries.

High OSI group

Among the 46 countries with high OSI values (0.50 to 0.75), 34 have divergent HCI and/or TII levels (see table 1.7).

Table 1.7 TII and HCI subcomponent convergence and divergence for the high OSI group, 2020

High OSI					
Very High HCI +Very High TII	High TII + Very High HCI	Very High TII + High HCI	High HCI + Middle TII	High HCI + Low TII	Middle HCI + Low TII
Barbados, Belarus, Belgium, Brunei Darussalam, Czech Republic, Germany, Greece, Israel, Latvia, Liechtenstein, Romania, Saudi Arabia, Slovakia	Armenia, Azerbaijan, Bahamas, Costa Rica, Georgia, Hungary, Iran (Islamic Republic of), Kyrgyzstan, Mauritius, Philippines, Seychelles, Sri Lanka, Ukraine	Qatar	Bangladesh, Egypt, Kenya, Rwanda	Uganda	Pakistan, United Republic of Tanzania

Source: 2020 United Nations E-Government Survey.

Thirteen countries with very high levels of human capital development and well-developed infrastructure (Barbados, Belarus, Belgium, Brunei Darussalam, Czech Republic, Germany, Greece, Israel, Latvia, Liechtenstein, Romania, Saudi Arabia and Slovakia) have relatively lower OSI values. Apart from Barbados and Brunei Darussalam, these countries also have very high EGDI values, but focusing on improvements in online services provision could greatly accelerate progress in overall e-government development.

In another group of 13 countries with very highly developed human capital—Armenia, Azerbaijan, Bahamas, Costa Rica, Georgia, Hungary, Islamic Republic of Iran, Kyrgyzstan, Mauritius, Philippines, Seychelles, Sri Lanka and Ukraine—progress has stalled somewhat, likely owing to their relatively less developed telecommunications infrastructure (reflected in TII scores ranging from 0.5289 to 0.7475).

Qatar, like other countries that are part of the Cooperation Council for the Arab States of the Gulf, has a very high level of infrastructure development and may benefit from a sharper focus on human capital development and the improvement of online services.

Among the countries with high OSI values, Bangladesh, Egypt, Kenya, Rwanda, Uganda, Pakistan and the United Republic of Tanzania are particularly worthy of note for their impressive advancements in online services provision despite having middle or low levels of infrastructure development. These countries, some of which are LDCs and/or LLCDs, are low- or lower-middle-income economies.

Box 1.1 Bangladesh, Bhutan and Cambodia

Three LDCs in Southern Asia—Bangladesh, Bhutan and Cambodia—moved from the middle EGDI group in 2018 to the high EGDI group in 2020 and are working on different e-government initiatives to improve efficiency and capacity in public services delivery.

Bhutan moved up from the middle EGDI group in 2018 to rank highest among the LDCs in 2020, in part due to improvements in its telecommunications infrastructure. The country has extended Internet connectivity to around a thousand government offices, schools and hospitals, allowing the provision of e-government services such as online business licensing and customs-trade approvals. Government officials and teachers have also benefited from ICT through the use of digital platforms to improve their digital skills. International and regional cooperation has also played an important role in the country's improved performance. The World Health Organization and the Indian Institute of Health collaborated on the deployment of an electronic patient information system and a centralized health data warehouse that have helped improve quality and efficiency in the delivery of health services.

In **Bangladesh**, success in advancing the country's e-government development has largely derived from strengthening the online connectivity of the public sector, online service delivery, and investments in the digital literacy of public sector employees. In the past few years, the country has worked on unifying 46,000 virtual government offices and providing information and government services nimbly and efficiently. Bangladesh has also invested in developing e-literacy and ICT skills among public sector employees and providing continuous learning opportunities through government-created open-learning-platform training in digital and professional skills. By 2020, nearly all employees of the central Government had access to the Internet and could use ICT tools in their daily work. The country operates an exclusive portal to educate teenagers in science and technology to further expand digital literacy within the country.

In **Cambodia**, the improvement of the telecommunications infrastructure and high rates of mobile phone penetration have played an important role in propelling the country's move from the middle to the high EGDI group. In 2020 there were 120 mobile cellular phone subscriptions per 100 inhabitants in Cambodia. The country has also been using social media platforms and websites at the national and local government levels to engage citizens in decision-making processes. As a result, the country has moved up 42 positions in the E-Participation Index (EPI) measured by the Survey. At the same time, infrastructure and human capital in Cambodia are at a higher level of development than online services provision.

Sources: 2020 Member States Questionnaires for Bhutan, Bangladesh and Cambodia; M.S. Gurung and others, "Transforming health care through Bhutan's digital health strategy: progress to date", *WHO South-East Asia J Public Health*, vol. 8 (2019), pp. 77-82, available at http://www.who-seajph.org/text.asp?2019/8/2/77/264850.

Middle OSI group

Divergences are especially prevalent among the countries with middle OSI values (0.25 to 0.50); of the 72 countries in this group, 66 have different TII and/or HCI levels (see table 1.8).

Three small European countries (Andorra, Monaco and San Marino) have highly developed infrastructure and human capital but less developed services provision, with OSI values ranging from 0.2824 to 0.4824.

Infrastructure and human capital development is also more advanced than online services provision in Montenegro, Antigua and Barbuda, Fiji, Grenada, Mongolia, Saint Kitts and Nevis, Dominica, Algeria, Bosnia and Herzegovina, Botswana, Cabo Verde, Cambodia, Gabon, Jamaica, Jordan, Maldives, Morocco, Myanmar, Namibia, Saint Lucia and Suriname.

Angola, Belize, Cameroon, Congo, Cuba, Eswatini, Guatemala, Guyana, Honduras, Kiribati, Lebanon, Lesotho, Madagascar, Marshall Islands, Federated States of Micronesia, Nepal, Nicaragua, Palau,

Table 1.8 TII and HCI subcomponent convergence and divergence for the middle OSI group, 2020

Middle OSI					
Very High HCI +Very High TII	Very High HCI + High TII	Very High HCI + Middle TII	Very High HCI + Low TII	High HCI + Very High TII	High HCI + High TII
Monaco, San Marino	Montenegro, Antigua and Barbuda, Fiji, Grenada, Mongolia, Saint Kitts and Nevis	Venezuela (Bolivarian Republic of), Cuba, Palau, Tonga	Marshall Islands	Andorra	Dominica, Algeria, Bosnia and Herzegovina, Botswana, Cabo Verde, Cambodia, Gabon, Jamaica, Jordan, Maldives, Morocco, Myanmar, Namibia, Saint Lucia, Suriname
Middle OSI					
High HCI + Middle TII	High HCI + Low TII	Middle HCI + High TII	Middle HCI + Low TII	Low HCI + Middle TII	Low HCI + Low TII
Belize, Eswatini, Guatemala, Guyana, Honduras, Lebanon, Lesotho, Nepal, Nicaragua, Saint Vincent and the Grenadines, Samoa, Syrian Arab Republic, Tajikistan, Timor-Leste, Togo, Tuvalu, Vanuatu, Zambia, Zimbabwe	Angola, Cameroon, Congo, Kiribati, Madagascar, Micronesia (Federated States of)	Côte d'Ivoire, Iraq	Afghanistan, Burundi, Ethiopia, Malawi, Mozambique, Solomon Islands, Yemen	Mali	Niger, Somalia

Source: 2020 United Nations E-Government Survey.

Saint Vincent and the Grenadines, Samoa, Syrian Arab Republic, Tajikistan, Timor-Leste, Togo, Tonga, Tuvalu, Vanuatu, Bolivarian Republic of Venezuela, Zambia and Zimbabwe have high or very high levels of human capital development but underperform in online services delivery, probably owing to unevenly developed infrastructure.

A high level of infrastructure development constitutes a solid foundation for improving online services provision in Côte d'Ivoire and Iraq, but Afghanistan, Burundi, Ethiopia, Malawi, Mali, Mozambique, Niger, Solomon Islands, Somalia and Yemen have made strides in online services delivery despite low levels of infrastructure and human capital development.

Low OSI group

Of the 21 countries with low OSI values (0.00 to 0.25), 15 have divergences in HCI and/or TII levels (see table 1.9).

Table 1.9 TII and HCI subcomponent convergence and divergence for the low OSI group, 2020

Low OSI		
High HCI + Low TII	Middle HCI + Middle TII	Middle HCI + Low TII
Democratic People's Republic of Korea, Democratic Republic of the Congo, Equatorial Guinea, Lao People's Democratic Republic, Papua New Guinea	Comoros, Djibouti, Gambia (Republic of the), Guinea, Mauritania	Central African Republic, Eritrea, Guinea-Bissau, Haiti, Liberia

Source: 2020 United Nations E-Government Survey.

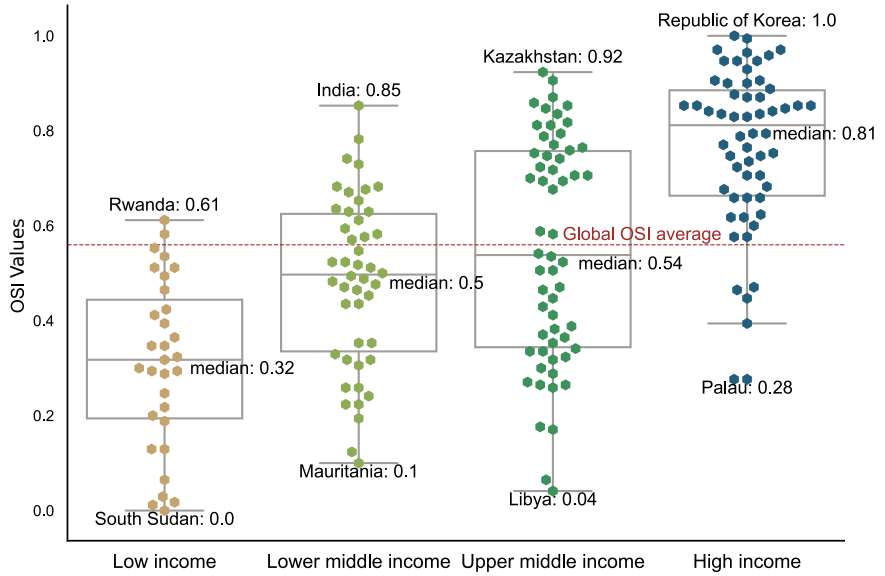
Online services provision lags behind infrastructure and human capital development in Comoros, Djibouti, Republic of the Gambia, Guinea and Mauritania. At the same time, due to poor telecommunications infrastructure, the Democratic People's Republic of Korea, Central African

Republic, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Guinea-Bissau, Haiti, Lao People's Democratic Republic, Liberia and Papua New Guinea are falling behind, despite having high and middle levels of human capital development.

1.6.1 Country OSI levels by income group

As expected, the countries with higher income levels generally have higher OSI values, and they are also more homogeneous in terms of their e-government development (see figure 1.8). Most countries in the high-income bracket have a median OSI value above 0.81, whereas for all other income groups the OSI median values are below the global OSI average of 0.5620. High-income countries also have a denser distribution of OSI scores around the median value, suggesting a more even provision of online services.

Figure 1.8 Geographical distribution of the four EGDI groups, 2020



Source: 2020 United Nations E-Government Survey.

Similarly, 16 of the 58 countries in the upper-middle-income group (Albania, Argentina, Brazil, Bulgaria, China, Colombia, Dominican Republic, Ecuador, Kazakhstan, Malaysia, Mexico, Peru, Russian Federation, Serbia, Thailand and Turkey) have very high OSI values and in online services provision are closer to the high-income countries.

While these results are consistent with trends observed in previous Surveys, there are countries that do not follow this pattern. For instance, six countries in the high-income group (Andorra, Antigua and Barbuda, Monaco, Palau, Saint Kitts and Nevis, and San Marino) have OSI values ranging between 0.2765 and 0.4824, and two countries in the upper-middle-income group (Libya and Equatorial Guinea) have some of the lowest OSI values (0.0412 and 0.0647, respectively).

Some countries with low- or lower-middle-income levels deliver rather well in online services provision. There are 20 such countries with very high OSI values (Uzbekistan, Republic of Moldova and India) or high OSI values (Bangladesh, Bhutan, Plurinational State of Bolivia, Egypt, El Salvador, Ghana, Indonesia, Kenya, Kyrgyzstan, Pakistan, Philippines, Rwanda, Tunisia, Uganda, United Republic of Tanzania and Viet Nam). Nine of these countries are LDCs and/or LLDCs.

This suggests that even countries with limited resources can achieve progress in online services provision and e-government development if they are supported in other ways (through visionary leadership, enabling policy frameworks or international cooperation, for example).

1.7 Trends in online transactional services

Data for 2020 indicate that all countries but one (South Sudan) have national portals and back-end systems automating core administrative tasks, improving the availability of public services and promoting transparency and accountability within the public sector.

The number of countries offering at least one online transactional service increased from 140 in 2018 to 162 in 2020, or by 16 per cent (see table 1.10). Moreover, the prevalence of some online services—such as applying for building permits, driving licences and personal identification cards—increased by 100 to 150 per cent. In 2020, Member States provided on average 14 of the 20 assessed services online—an increase of 40 per cent since 2018.

Table 1.10 Trends in online transactional services, 2018-2020

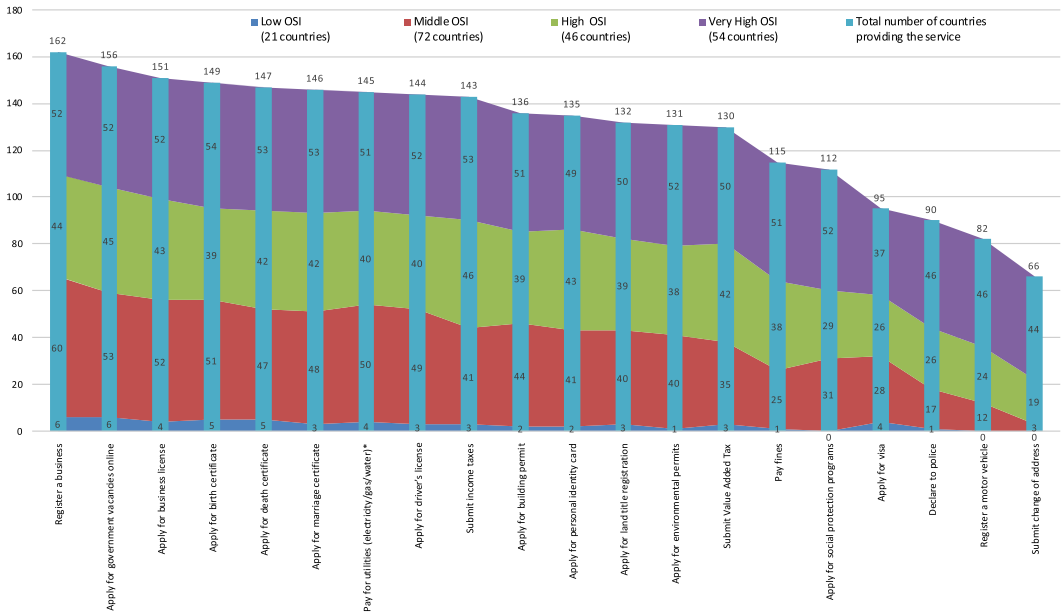
Transactional services available online	2018	2020	Percentage change
Apply for birth certificate	83	149	80
Apply for building permit	55	136	147
Apply for business license	103	151	47
Apply for death certificate	74	147	99
Apply for driver's license	59	144	144
Apply for environmental permits	74	131	77
Apply for government vacancies online	132	156	18
Apply for land title registration	67	132	97
Apply for marriage certificate	78	146	87
Apply for personal identity card	59	135	129
Apply for social protection programs	85	112	32
Apply for visa	99	95	-4
Declare to police	84	90	7
Pay fines	111	115	4
Pay for utilities (water, gas, electricity)	140	145	4
Register a business	125	162	30
Register a motor vehicle	76	82	8
Submit change of address	58	66	14
Submit income taxes	139	143	3
Submit Value Added Tax	116	130	12

Source: 2020 United Nations E-Government Survey.

Globally, the most prevalent online transactional service is the registration of a new business (see figure 1.9); 162 of the 193 countries surveyed now offer this service, representing a 30 per cent increase (37 additional countries) since 2018.

Applying for government vacancies and business licences, requesting birth, death and marriage certificates, and paying for utilities are the next most commonly offered online services across the globe. Submitting a change of address online is the least common transaction, with only 66 countries offering this service.

Figure 1.9 Trends in online transactional services, by OSI level, 2020



Source: 2020 United Nations E-Government Survey.

*In 2020, the Survey team collected disaggregated data on payments for separate types of utilities (electricity/gas and water); for previous Surveys, these utilities had been assessed together. The change was introduced to facilitate more accurate tracking of services provision in all countries. For comparison with previous Surveys, the number of countries that provided services for utility payments for both gas/electricity and water was eliminated from the total, and only new countries offering the services were added to the total number.

Globally, 66 per cent of Member States provide online transactional services in 2020. Prevalence rates are highest in the very high and high OSI groups (93 and 81 per cent, respectively), covering the full spectrum of the 20 services assessed in 2020. In the middle and low OSI groups, the respective prevalence rates are 53 and 13 per cent. It is important to note that progress in online services delivery is being made even in countries with low OSI levels, where the average number of online services offered rose from 1 in 2018 to around 3 in 2020.

Since 2018, five countries (Chad, Comoros, Djibouti, Nauru and Turkmenistan) have begun offering at least one online service, with Djibouti offering as many as seven.

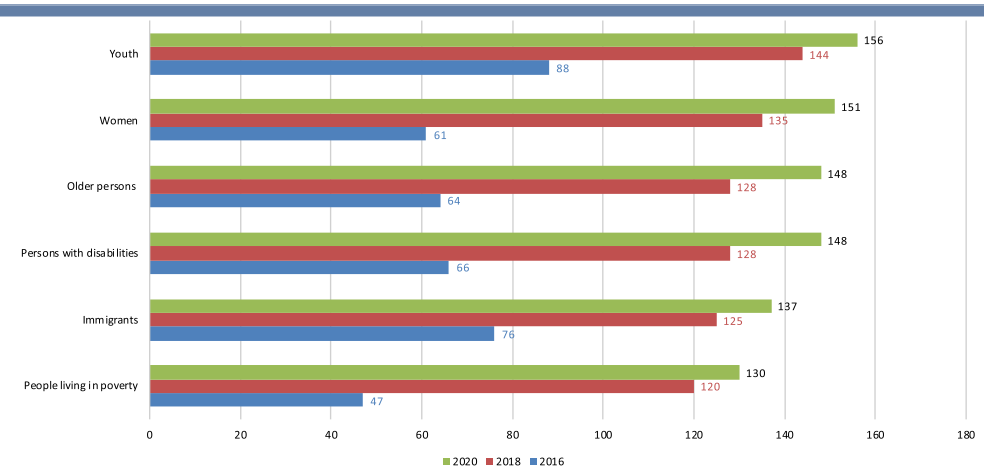
The majority of low OSI countries still offer only one or two online services; however, 6 of the 21 countries in this category (Djibouti, Haiti, Lao People's Democratic Republic, Liberia, Papua New Guinea, and Sao Tome and Principe) provide between five and nine types of services.

The five most common services provided by countries in the middle and low OSI groups are registering a business, applying for a business licence, applying for government vacancies, and applying for birth and death certificates.

1.7.1 Targeted services for vulnerable groups

The positive trend towards expanding the provision of online services designed for vulnerable populations continues. Since 2018, the number of countries offering online information and services specifically targeting vulnerable groups has increased by around 11 per cent; such services are offered to young people (156 countries), women (151 countries), migrants (148 countries), older persons (148 countries), persons with disabilities (137 countries), and people living in poverty (130 countries) (see figure 1.10).

Figure 1.10 Numbers of countries providing online services to vulnerable groups, 2016, 2018 and 2020



Source: 2020 United Nations E-Government Survey.

The highest rates of growth have been in the provision of online services for older persons and migrants (a 14 per cent increase for each group) and for women (an increase of 11 per cent). Where specific services are in place, Governments provide information to older persons on retirement housing facilities and on how to apply for long-term care programmes and choose options to receive care and support at home. Young people receive information and support relating to specific employment programmes, scholarships and government funding, and people living in poverty are provided with information on applying for government support. It should be noted, however, that services for people living in poverty and persons with disabilities are offered by fewer countries, which highlights the possibility that the needs of these groups are being neglected in some contexts.

1.7.2 Sector-specific online services

The 2030 Agenda for Sustainable Development recognizes that ending poverty and other deprivations goes hand-in-hand with improving health and education, tackling environmental challenges, spurring economic growth through decent employment, and protecting the most vulnerable groups. Another key objective—addressed in SDG 16—is promoting peaceful and inclusive societies that provide access to justice for all.

The United Nations E-Government Survey has been tracking the development of online services relating to health, education, employment, the environment and social protection since 2016. In 2020, for the first time, the Survey also assessed the websites of justice departments and ministries on the availability of and access to public services related to promoting justice and due process as a proxy for assessing progress towards the achievement of the SGD 16 objective of providing access to justice for all. Among other things, the Survey assessed whether users could file or open court cases online, manage or retrieve information on their cases, or apply online to receive an affidavit of criminal history or background clearance.

According to the Survey results for 2020, the number of countries that proactively share public information and provide online services through emails, SMS/RSS feed updates and mobile applications (apps) has risen in all sectors.

1.7.3 Sharing public information

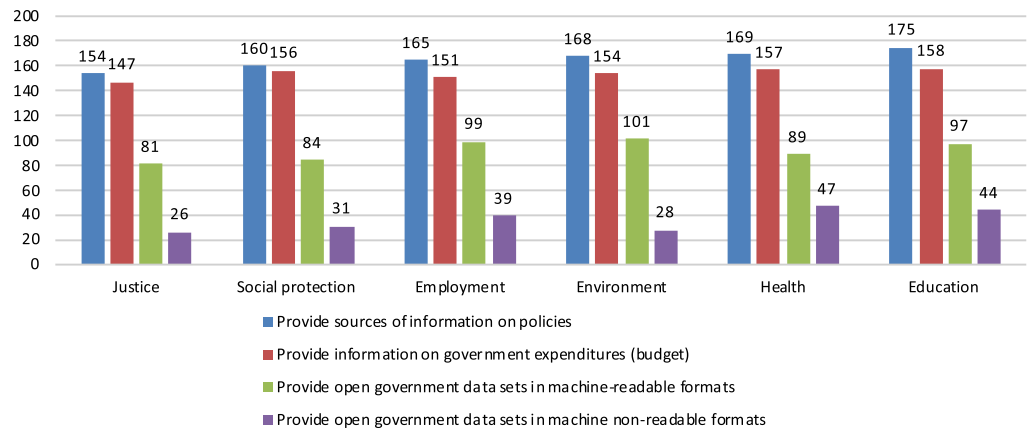
Proactively sharing information and government data with the public contributes to building effective, accountable and inclusive institutions (in line with SGD 16); hence, the Surveys regularly assess whether Governments provide information on policies related to specific sectors and share government data online in machine-readable/non-readable formats. Denoting a positive trend, it is increasingly common to find sector-specific information on dedicated government websites.

In 2020, around 80-90 per cent of Member States provide information to the public on sector-specific policies and programmes. Many countries also share government expenditures and budgets with the public, often in open formats. Figure 1.11 presents the numbers for each sector.

Importantly, the prevailing trend in data provision on government portals has been to shift from non-machine-readable formats (such as PDF) to machine-readable formats in all sectors.

Compared with 2018, there has been an increase of approximately 50 per cent in the number of OGD portals that provide sector-specific information in machine-readable formats. The highest increase has been in the environment sector, where the number of countries with OGD portals offering machine-readable content has risen from 58 to 101 (74 per cent) since 2018.

Figure 1.11 Trends in sharing public information online, 2020



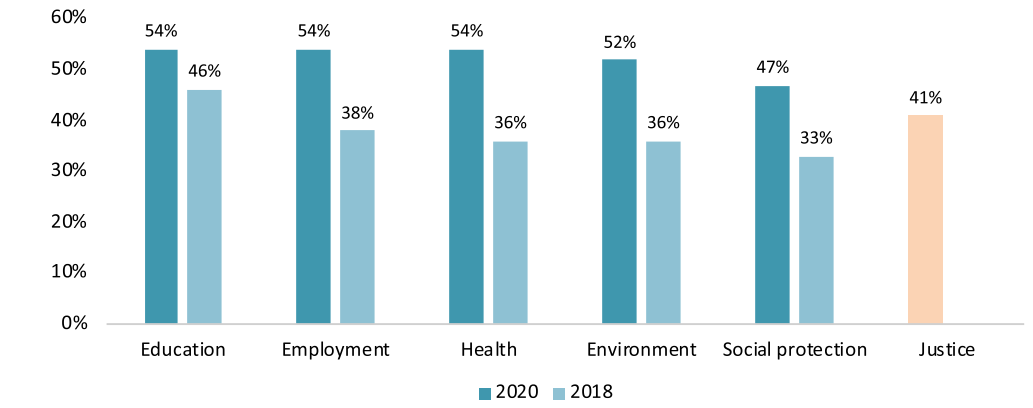
Source: 2020 United Nations E-Government Survey.

1.7.4 Mobile services delivery

As shown in figure 1.12, the percentage of countries providing updates via mobile apps or SMS has increased in all sectors in 2020. The number of countries offering updates via SMS or apps has expanded by an average of 38 per cent since 2018, which is double the rate of expansion in the number of countries offering updates via subscriptions (an average of 19 per cent). The most notable expansion in mobile services delivery since 2018 has been in the environment sector, which registered a 20 per cent increase.

For the sharing of public information, both mobile update subscriptions and apps/SMS are expanding across all sectors (see figure 1.13). In descending order of prevalence, mobile update subscriptions are offered in the education sector (127 countries), environment sector (116 countries), and health and employment sectors (115 countries in each case), while apps or SMS are more commonly used for updates in the education sector (107 countries) and the employment and health sectors (106 countries each).

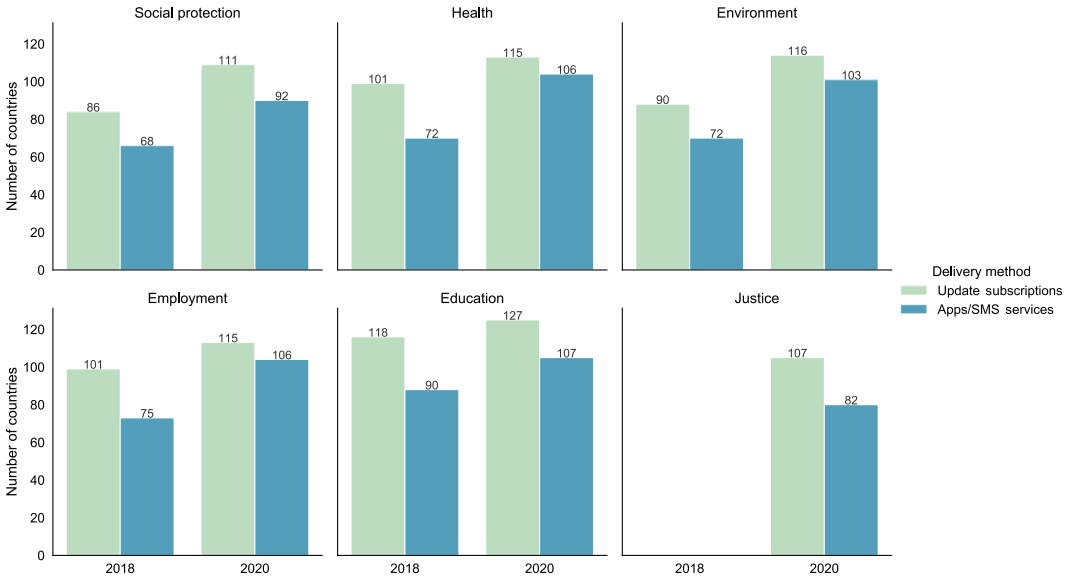
Figure 1.12 Percentage of 193 United Nations Member States offering mobile apps or SMS for public information updates, by sector, 2018 and 2020



Source: 2018 and 2020 United Nations E-Government Surveys.

Note: As the justice sector component was added in 2020, no comparative data are available for 2018.

Figure 1.13 The delivery of public information via update subscriptions and apps/SMS, by sector, 2020

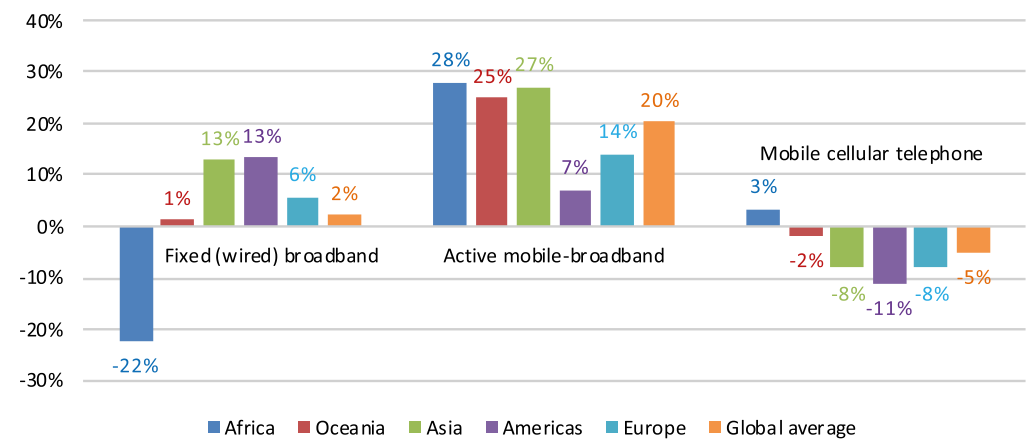


Source: 2018 and 2020 United Nations E-Government Surveys.

The continued expansion of mobile services delivery is linked to the following: improved access to fixed (wired) broadband and a global average increase of 2 per cent in subscriptions for this service; a global average increase of 20 per cent in active mobile subscriptions (see figure 1.14); and a higher percentage of individuals using the Internet.

The only region in which fixed (wired) broadband subscriptions declined is Africa, where the usage rate dropped from 2.2 to 1.8 per 100 persons between 2018 and 2020 (see table 1.11). During the same period, usage rates per 100 inhabitants increased from 7.1 to 7.2 in Oceania, from 9.5 to 10.9 in Asia, and from 12.3 to 14.2 in the Americas. Europe has the highest rate of fixed broadband use, at around 32.2 people per 100, a slight increase from 30.4 in 2018.

Figure 1.14 Percentage change in fixed (wired) broadband, active mobile broadband, and mobile cellular subscriptions per 100 inhabitants, by region, 2018-2020



Source: 2020 United Nations E-Government Survey 2020.

Table 1.11 Fixed (wired) broadband, active mobile broadband and mobile cellular subscriptions, by region, 2020

	Fixed (wired) broadband subscriptions per 100 inhabitants		Active mobile broadband subscriptions per 100 inhabitants		Mobile cellular telephone subscriptions per 100 inhabitants		Percentage of individuals using the Internet	
	2018	2020	2018	2020	2018	2020	2018	2020
Africa	2.2	1.8	29	37	76	78.7	24	27
Oceania	7.1	7.2	32	40	83	81.6	54	61
Asia	9.5	10.9	49	62	111.3	103.1	50	57
Americas	12.3	14.2	68	73	116.4	104.9	39	41
Europe	30.4	32.2	80	91	122.2	113.1	78	82
Global average	12.3	13.26	51.6	60.6	101.78	96.28	49	54

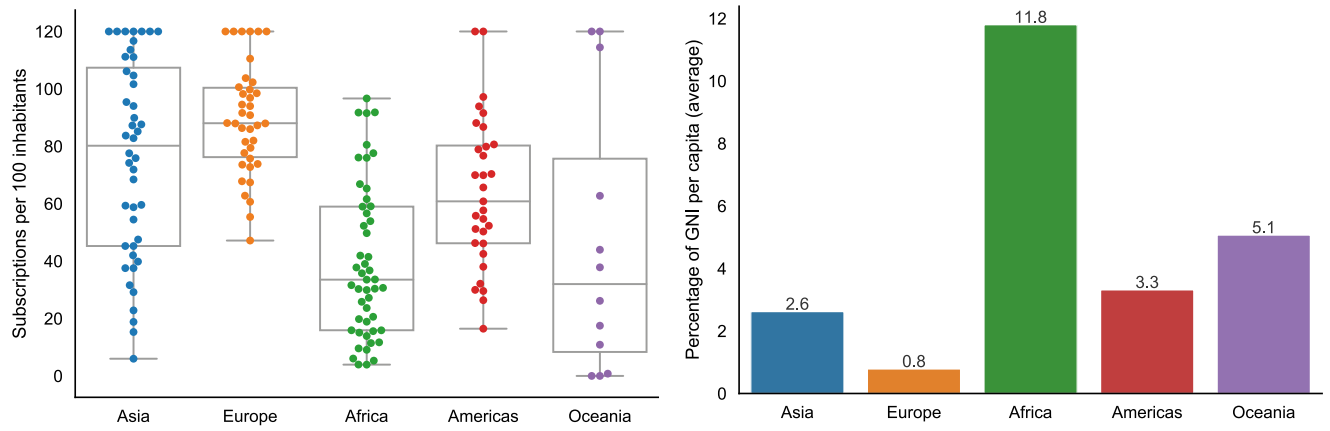
Source: International Telecommunication Union, Statistics (2020), available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

The number of active mobile (wireless) broadband subscriptions per 100 persons in Africa increased from 29 in 2018 to 37 in 2020. In Oceania, the corresponding usage rates increased from 32 to 40 during this period. Subscription rates per 100 inhabitants also rose significantly in the Americas (from 68 to 73) and in Asia (from 49 to 62). As with fixed broadband, Europe is the leader, with an overall subscription rate of 91 per 100 persons in 2020, up from 80 in 2018. Globally, subscriptions have increased by 20 per cent overall since the last edition of the Survey.

It should be noted that the cost of mobile broadband subscriptions as a percentage of gross national income per capita remains significantly higher in Africa and Oceania than in other parts of the world, contributing to the digital divide (see figure 1.15).

According to data released by the International Telecommunication Union, mobile phone subscription rates have decreased slightly over the past two years, except in Oceania, where usage has increased from 76 to 78.7 per 100 inhabitants. The decline in the rest of the world might indicate that a substantial number of countries have reached the saturation point, especially in the Americas, Asia, and Europe, where the ratio has been above 100 mobile phone subscriptions per 100 inhabitants for the past several years.

Figure 1.15 The cost of active mobile broadband subscriptions as a percentage of gross national income, by region, 2020



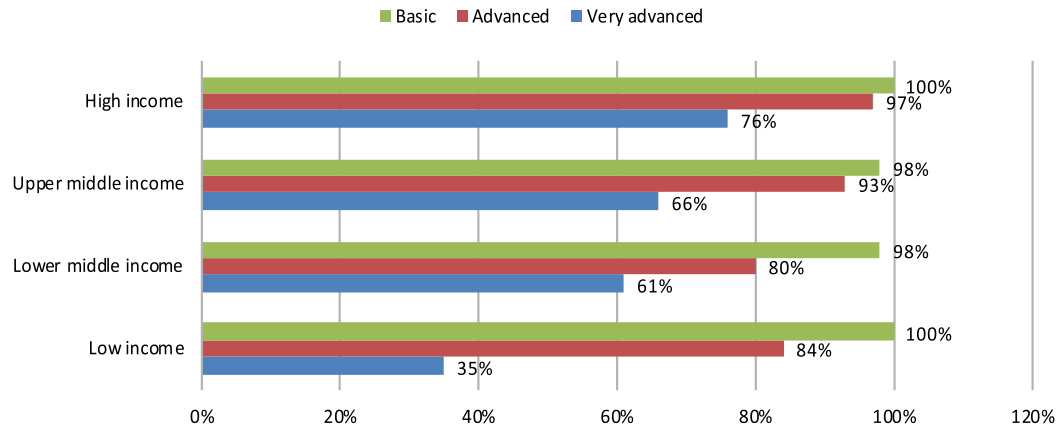
Source: International Telecommunication Union, Statistics (2020), available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

1.7.5 Online public services provision: national portal functions

Nearly all of the countries surveyed have some type of basic government portal that can be found on key search engines. The websites have a set of basic features such as the portal sitemap, basic search functions, frequently asked questions, and a "contact us" page (see figure 1.16). Close to 90 per cent of the countries have advanced e-government portals featuring a one-stop shop, social networking opportunities, and an interactive design with feedback options. Predictably, the highest prevalence of such portals is among the high-income countries (97 per cent); interestingly, the lowest prevalence is among the lower-middle-income countries (80 per cent) rather than the low-income countries (84 per cent).

Less prevalent in e-government portals are the very advanced features, including advanced search options, tutorials, chats, and corruption flagging. If offered, such features are more common in the portals of high-income economies (76 per cent) and middle-income economies (65 per cent); lower-

Figure 1.16 Availability of basic, advanced and very advanced features on national e-government portals, by country income level



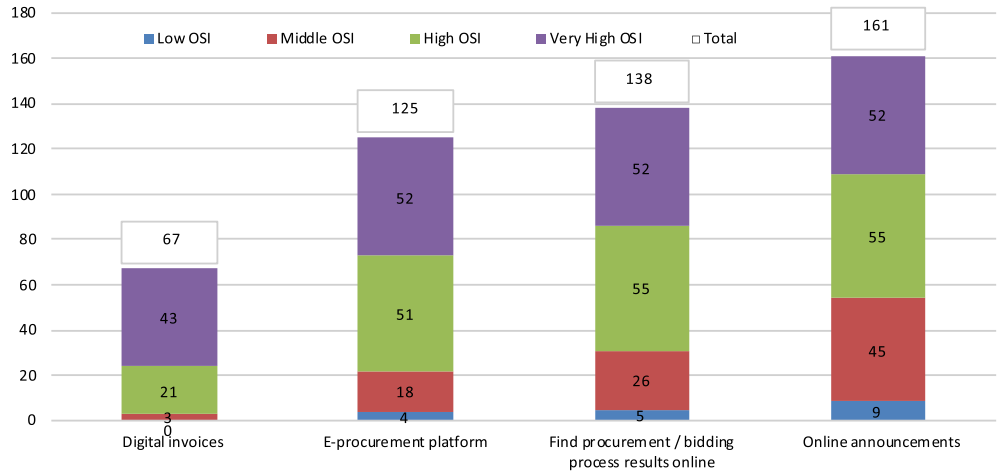
Source: 2020 United Nations E-Government Survey.

middle-income economies are not far behind (61 per cent), but only about a third (35 per cent) of low-income country portals have such features. High-income countries as a group offer more advanced services on e-government portals.

1.7.6 Public procurement services

Overall, 161 of the 193 countries surveyed release online announcements related to government procurement processes (see figure 1.17). While the majority of countries with very high, high and middle OSI levels offer such services, only around 40 per cent of the States in the low OSI group do so.

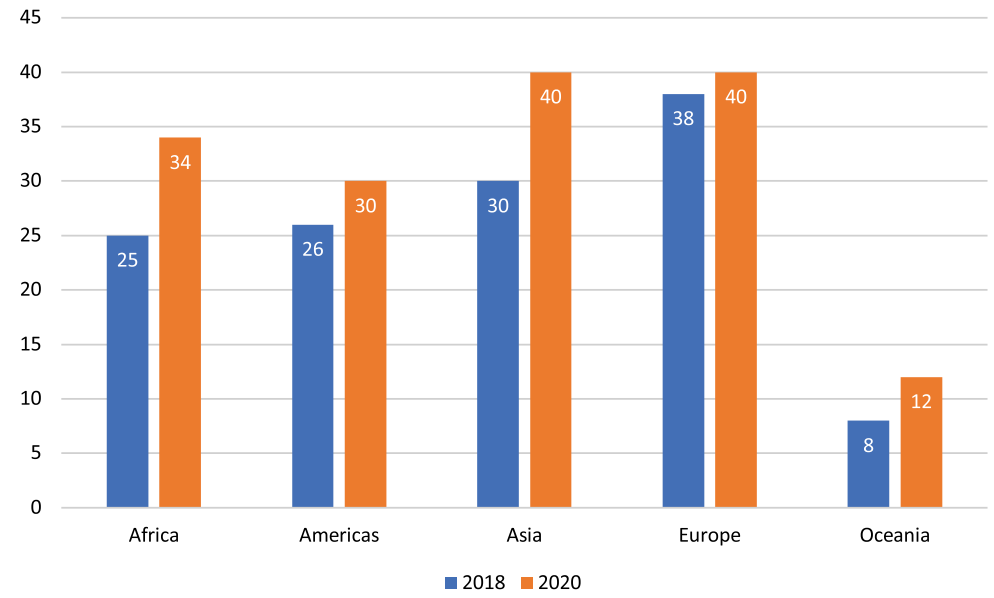
Figure 1.17 Number of countries offering tools for e-procurement*



Source: 2020 United Nations E-Government Survey.

* Among the 193 United Nations Member States surveyed.

Figure 1.18 Number of countries publishing government vacancies online, 2018 and 2020



Source: 2018 and 2020 United Nations E-Government Surveys.

A majority of Member States provide the results of procurement/bidding processes online (138 countries) and have functional e-procurement platforms (125 countries), and about a third (67 countries) provide digital invoice services. While 81 per cent of the countries with very high OSI values offer digital invoices, similar services are offered by only 34 per cent of countries with high OSI values and 5 per cent of countries with middle OSI values.

The number of countries publishing government vacancies online rose between 2018 and 2020 (see figure 1.18). Currently, 156 countries offer this service, up from 127 countries in 2018. At the regional level, Europe has the highest proportion of countries recruiting for public positions online (40 of 43 countries), while Africa has the lowest (34 of 54 countries).

1.8 Summary and conclusion

The key takeaways from this chapter are summarized below.

E-government development levels have improved globally across all regions and all income groups and among countries in special situations.

- The level of e-government development globally has improved, with the average EGDI value increasing from 0.55 in 2018 to 0.60 in 2020. With 34 countries newly entering the high and very high EGDI groups in 2020, these two groups now account for the majority of Member States (126 of 193 countries).
- Progress is noticeable even in countries in special situations; the number of LDCs, LLDCs and SIDS with high and very high EGDI values now totals 35—a 29 per cent increase from 2018. Nine of the 35 countries are lower-middle-income and have advanced in e-government development despite their limited resources.
- Presently, only eight countries are struggling to move forward with e-government development and have low EGDI values (below 0.25)—a 50 per cent decline from 2018.

Income levels support but do not fully determine progress in e-government development.

- Generally speaking, EGDI levels appear to be positively correlated with national income levels, but financial resources are not the only critical factor. Often, countries that have committed to improving online services provision (reflected in higher OSI values) can overcome the constraints imposed by inadequate levels of infrastructure and human capital development. Twenty low- and lower-middle-income countries have made significant progress in the provision of online services. Between 2018 and 2020, the average EGDI value for lower-middle-income countries increased from 0.43 to 0.50, marking the most rapid progress achieved by any group during this period.

Online services provision is expanding and may enable Governments to be more efficient, open, transparent and inclusive.

- The number of countries offering at least one online transactional service increased from 140 in 2018 to 162 in 2020. More than 84 per cent of these countries offer at least one—and on average 14—of the 20 online transactional services assessed in the Survey, reflecting a 40 per cent increase since 2018.
- The online services most commonly offered include registering a new business, applying for a business licence, requesting a birth, death or marriage certificate, and paying for utilities.
- In pursuit of the 2030 Agenda objective of leaving no one behind, between 67 and 80 per cent of the United Nations Member States offer specific online services for youth, women, migrants,

older people, persons with disabilities, and those living in poverty. A majority of Member States announce and provide the results of procurement/bidding processes online and have functional e-procurement platforms (138 and 125 countries, respectively), and roughly half as many (67 countries) provide digital invoices. There are 156 countries that publish government vacancies online—a 30 per cent increase since 2018.

National portal functions are increasing.

- All Member States except one have national portals and back-end systems automating core administrative tasks. Nearly all countries update their portals periodically and offer some basic functions such as a portal sitemap, search features and contact options.
- Close to 90 per cent of Member States have advanced e-government portals featuring a one-stop-shop, social networking opportunities, and an interactive design with feedback options.
- Less prevalent in e-government portals are the very advanced features, including advanced search options, tutorials, chats and corruption flagging. If offered, such features are more common in the portals of high-income economies (76 per cent) and middle-income economies (65 per cent).

Governments are sharing more information with the public.

- It is increasingly common to find sector-specific information, policies and programmes on dedicated government websites. Many countries share government expenditures and budgets with the public and offer online services related to education, employment, the environment, health, social protection, and justice/judicial matters.
- In providing data on government portals, countries are increasingly moving from non-machine-readable formats (such as PDF) to machine-readable formats. There has been a 50 per cent increase in the number of OGD portals that provide sector-specific information in machine-readable formats.

Trends in mobile services provision are improving.

- Governments are increasingly sharing public information and providing online services through emails, SMS/RSS feed updates, mobile apps and downloadable forms. The number of countries offering updates via SMS or mobile apps has increased by an average of 38 per cent since 2018. Mobile update subscriptions are offered most frequently in the education sector (127 countries), environment sector (116 countries), and health and employment sectors (115 countries each).
- The continued expansion of mobile services delivery is linked to improved access to fixed (wired) broadband and a global average increase of 2 per cent in subscriptions for this service; a global average increase of 20 per cent in active mobile subscriptions; and a higher percentage of individuals using the Internet.

The digital divide persists.

- Seven of the eight countries with the lowest EGDI values are LDCs and/or LLDCs in Africa.
- Globally, 83 per cent of United Nations Member States provide at least one online transactional service. However, the full spectrum of the 20 services assessed in 2020 is available mainly in countries with very high and high OSI values (93 and 81 per cent, respectively). Among the countries with middle and low OSI values, the proportions providing online services are 53 and 13 per cent, respectively. Most countries with low OSI values still offer one or two online services; only six offer between five and nine types of services.

All regions and income groups have countries with the potential for improvement in e-government development.

- Discrepancies in individual areas of e-government development exist even in highly developed regions. For instance, three small European countries (Andorra, Monaco and San Marino) have highly developed infrastructure and human capital but only moderately developed online services provision (with middle OSI values ranging from 0.2824 to 0.4824).
- The countries that have OSI values higher than their respective TII and HCI values are relatively well situated in terms of online services provision and can potentially progress more rapidly in e-government development if infrastructure and human capital development are accelerated. For this group of countries, online services provision should be coupled with investments in improving the telecommunications infrastructure and/or strengthening digital literacy.

Endnotes

1 The range of EGDI group values for each level are mathematically defined as follows: very high EGDI values range from 0.75 to 1.00 inclusive, high EGDI group values range from 0.50 to 0.7499 inclusive, middle EGDI values range from 0.25 to 0.4999 inclusive, and low EGDI values range from 0.0 to 0.2499 inclusive. In all references to these ranges in text and graphic elements, the respective values are rounded for clarity and are expressed as follows: 0.75 to 1.00, 0.50 to 0.75, 0.25 to 0.50, and 0.00 to 0.25.

2 See the annexes for a full explanation of the Survey methodology.

3 A quartile is a statistical term describing a division of data into four defined intervals. The quartile measures the spread of values above and below the mean by dividing the distribution of data into four groups. A quartile divides data into three points—a lower quartile, median, and upper quartile—to form four groups of the data set. In the 2020 United Nations E-Government Survey, the lower (or first) quartile in each EGDI group is denoted as L1, M1, H1 or V1 and is the middle number that falls between the smallest value of the data set and the median. The second quartile (L2, M2, H2 or V2) is also the median. The upper (or third) quartile, denoted as L3, M3, H3 or V3, is the central point that lies between the median and the highest number of the distribution. LM, MH, HV and VH are the highest data points in each EGDI group.

2. Regional E-Government Development and the Performance of Country Groupings

Photo credit: pixabay.com

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2.1 Introduction

This chapter offers an overview of e-government development at the regional level, identifying important trends and providing an analysis of regional performance as measured by the E-Government Development Index (EGDI).

The sections below present the key findings of the Survey on E-Government Development from a regional perspective, review and assess the state of online services provision in each region, and highlight trends in specific country groupings, including least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing States (SIDS).

2.2 Regional EGDI rankings

All regions have improved their average EGDI values since 2018, contributing to an increase in the global EGDI average (see figure 2.1). Africa and Oceania have made notable progress, having increased their EGDI values by 14 per cent each.

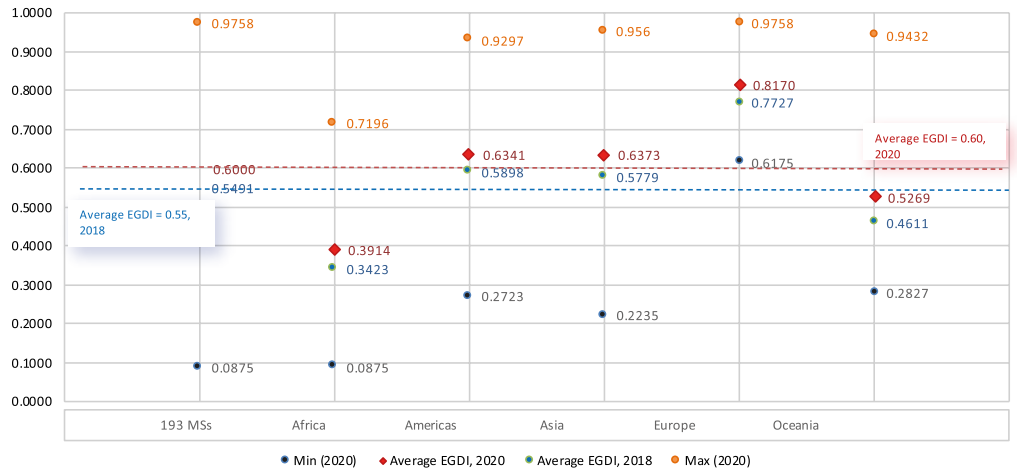
Europe remains the leader in e-government development, with an average EGDI value of 0.8170. All countries in Europe have EGDI values above the global average of 0.60. As noted previously, each of the four EGDI groups[1] are further divided into rating classes (quartile subgroups),[2] and 8 of the 14 countries in the highest (VH) rating class of the very high EGDI group are in Europe.

In 2020, for the first time, Asia is in the second position in terms of regional EGDI value (0.6373), followed by the Americas (0.6341), Oceania (0.5269) and Africa (0.3914). Despite the significant progress made in Oceania and Africa, their regional EGDI averages remain below the global average of 0.60.

These global and regional patterns are consistent with those in previous Surveys, with the exception of the Americas and Asia, which already had rather close average EGDI values in 2018 (0.5898 and 0.5779, respectively). The higher ranking of Asia in 2020 can be explained both by previous trends and by the current performance of many countries in the region. The transformational impact of digitalization in the region has been leveraged by the countries in the VH rating class (Republic of Korea, Singapore and Japan). Many other Asian countries (Saudi Arabia, China, Kuwait, Malaysia, Oman, Turkey and Thailand) have enhanced

their e-government services as well, moving from the high to the very high EGDI group. Others—such as Cyprus and Kazakhstan in the very high EGDI group and Indonesia, Iraq and Myanmar in the high EGDI group—have exhibited a more rapid increase in EGDI values within their respective groups (see annex).

Figure 2.1 Global and regional average EGDI values, 2020



Source: 2020 United Nations E-Government Survey.

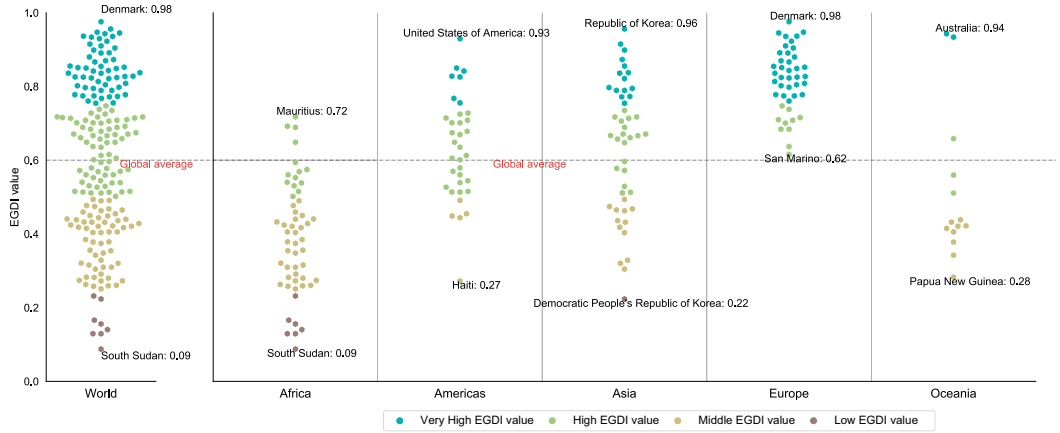
Europe has the lowest variance in country EGDI values (between 0.6175 and 0.9758), suggesting that the region is moving more rapidly than other regions towards convergence in the level of e-government development (see figure 2.2). The standard deviation[3] of EGDI values from the mean in Europe is around 0.09 (see figure 2.3), which is much lower than the corresponding deviation in the Americas (0.14), Africa (0.15), Asia (0.18), and Oceania (0.20) This means that the EGDI values among European countries are similar (the standard deviation is low/closer to zero), whereas in Oceania, for example, these values are highly variable (the standard deviation is higher/further from zero). The variances in e-government development among countries in Asia are most pronounced in online services provision and infrastructure development, as reflected in the region's Online Services Index (OSI) and Telecommunications Infrastructure Index (TII) values, whereas in Oceania the differences are most noticeable in infrastructure development (TII values).[4] From a policymaking perspective, these differences highlight the areas in which countries and regions should focus their efforts in order to improve their overall e-government development.

The high variance in Oceania is explained by the fact that while Australia and New Zealand are top performers, the majority (9 out of 14) of the remaining countries have EGDI values below the regional average of 0.5269, with Papua New Guinea having the lowest EGDI value (0.2826).

Africa has a relatively moderate variance in EGDI values (0.15), but in contrast with the other regions, almost its entire distribution falls below the global average EGDI value, highlighting gaps in e-government development and the persistence of the digital divide.

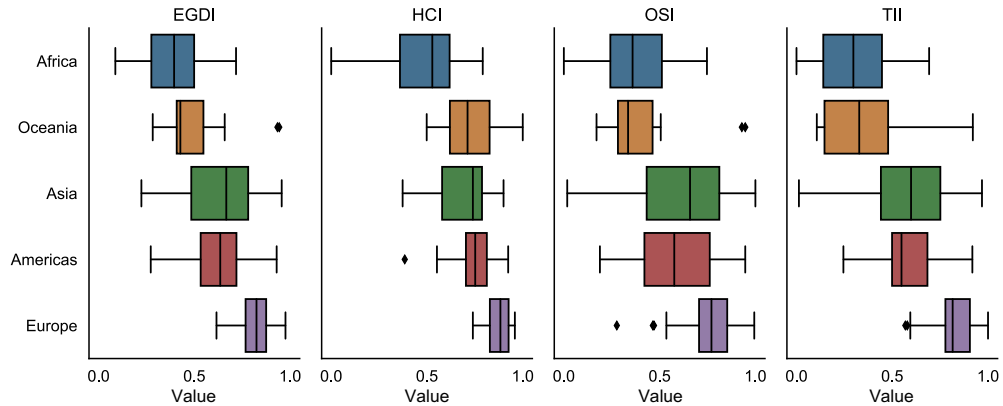
Although Asia and the Americas are roughly comparable in their levels of e-government development, intraregional variance in country values is wider in Asia, as there are three outliers in the highest (VH) EGDI rating class (Republic of Korea, Singapore and Japan), as well as some countries with the lowest EGDI values globally (Democratic People's Republic of Korea, Yemen, Afghanistan and Lao People's Democratic Republic).

Figure 2.2 Global and regional distribution of 193 countries according to EGDI level, 2020



Source: 2020 United Nations E-Government Survey.

Figure 2.3 Composition of the standard deviation in EGDI, OSI, HCI and TII levels, 2020



Source: 2020 United Nations E-Government Survey.

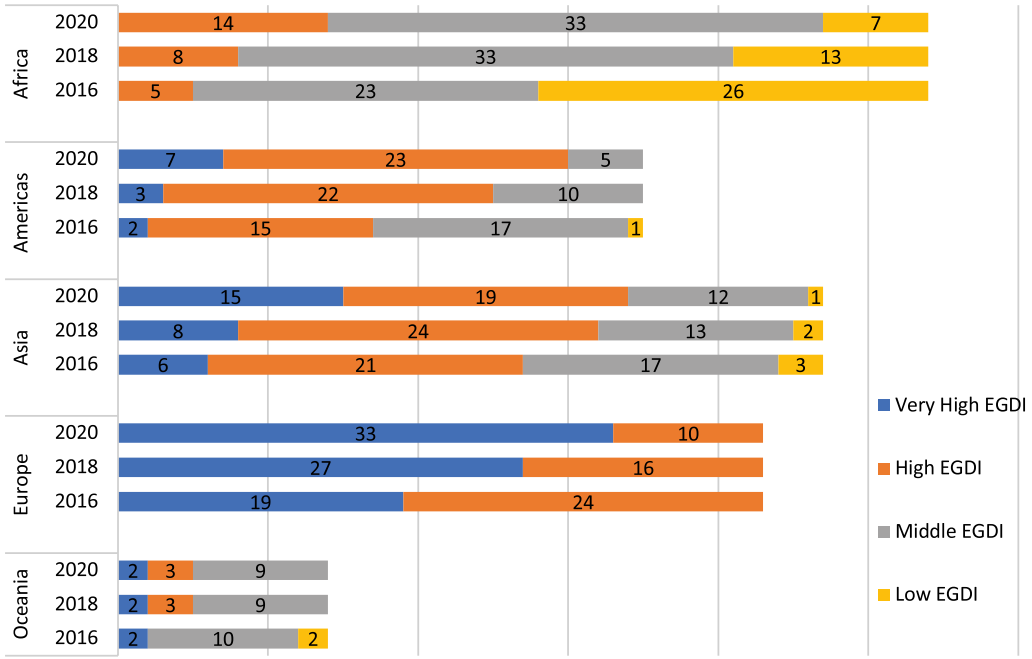
Figure 2.4 shows the regional distribution of countries by EGDI level over three consecutive Survey periods. In 2020, Europe accounts for the highest proportion of countries in the very high EGDI group (58 per cent), followed by Asia (26 per cent), the Americas (12 per cent) and Oceania (4 per cent).

The number of countries in the Americas in the very high and high EGDI groups has nearly doubled since 2016, collectively accounting for 86 per cent of the region. The seven countries in the very high EGDI group include the United States, Canada and Uruguay, which were already in this group, as well as four new countries in South America (Brazil, Argentina, Chile and Costa Rica). The remaining five countries in the Americas (14 per cent) have middle EGDI values.

In Asia, 15 countries (32 per cent of the region) are in the very high EGDI group, 19 countries (40 per cent) are in the high EGDI group, and 12 countries (26 per cent) are in the middle EGDI group. Only one country (Democratic People's Republic of Korea) is in the low EGDI group.

In Africa, the majority of countries (61 per cent) are in the middle EGDI group; however, the number of countries in the high EGDI group has almost doubled since 2018, increasing from 8 to 14 and now accounting for 26 per cent of the region. Four countries in Africa—Mauritius, Seychelles,

Figure 2.4 Regional distribution of countries by EGDI level, 2016, 2018 and 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

South Africa and Tunisia—have EGDI values that are above the global average (ranging from 0.6526 to 0.7196) and are leading the region in terms of e-government development. Significant progress has also been made in reducing the number of countries in the low EGDI group (from 13 to 7 between 2018 and 2020); the seven countries in this category (Central African Republic, Chad, Eritrea, Guinea-Bissau, Niger, Somalia and South Sudan) are all low-income economies, countries in conflict, and fragile States.

2.2.1 Regional overview of country movement between EGDI groups

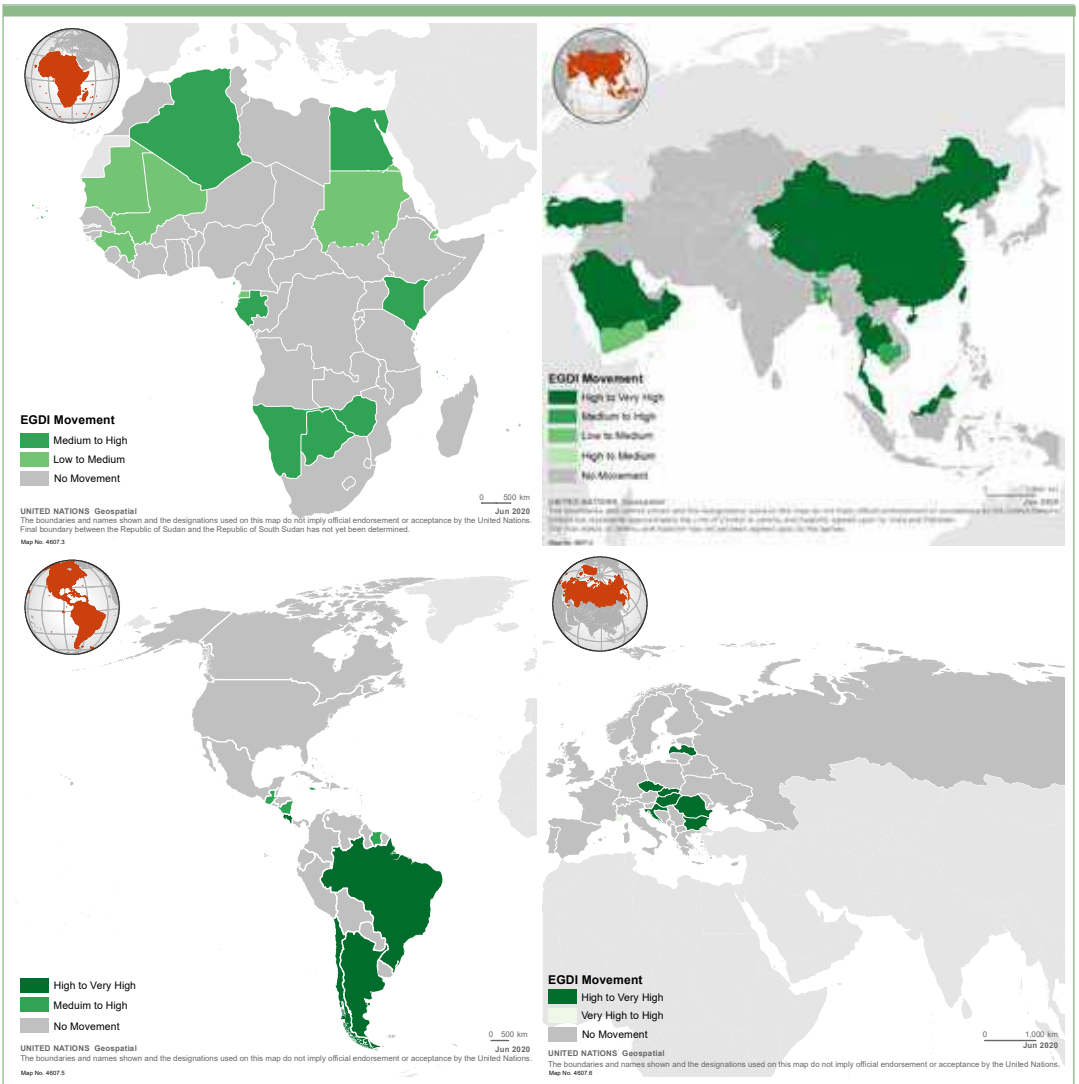
As highlighted in chapter 1, among the most important and positive changes worth noting in the 2020 Survey is the movement of 42 countries (22 per cent of all United Nations Member States) to a higher EGDI group (see figure 1.4). Specifically, 18 countries moved from the high to the very high EGDI group, 16 moved from the middle to the high group, and 8 moved from the low to the middle group.

At the regional level, positive changes in levels of e-government development were most apparent in Africa, where 15 countries (28 per cent) moved to a higher EGDI group. These results show that Africa is experiencing digital progress despite the persistence of the digital divide (reflected in Africa having the lowest regional EGDI average and the largest number of countries in the low EGDI group).

The Americas had the second-largest share of countries achieving higher EGDI levels in 2020 (26 per cent, or 9 countries), followed by Asia (23.4 per cent, or 11 countries) and Europe (16.3 per cent, or 7 countries). In Oceania, all countries remained within the same EGDI groups, though relevant EGDI values indicate that the region as a whole has improved in terms of e-government development.

More detailed information on the upward movement of the 42 countries with improved EGDI levels is provided below.

Figure 2.5 Infographic of country movement between different EGDI groups, by region, 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

In Africa, seven countries moved from the low to the middle EGDI group (Sudan, Mali, Mauritania, Comoros, Djibouti, Guinea and Equatorial Guinea), and eight moved from the middle to the high EGDI group (Namibia, Cabo Verde, Egypt, Gabon, Botswana, Kenya, Algeria and Zimbabwe).

In the Americas, four countries (Argentina, Chile, Brazil and Costa Rica) moved from the high to the very high group, and five countries (Saint Lucia, Jamaica, Guatemala, Suriname and Nicaragua) transitioned from the middle to the high EGDI group.

In Asia, Yemen moved from the low to the middle EGDI group, three countries (Bhutan, Bangladesh and Cambodia) moved from the middle to the high group, and seven countries (Saudi Arabia, China, Kuwait, Malaysia, Oman, Turkey and Thailand) shifted from the high to the very high group. Lebanon is the only country in Asia that experienced a downward move (from the high to the middle EGDI group), but this drop is associated more with the methodological changes introduced in the TII and HCI than with any real disinvestment in digital government.

In Europe, seven countries moved from the high to the very high EGDI group (Czech Republic, Bulgaria, Slovakia, Latvia, Croatia, Hungary and Romania). Monaco is the only country in Europe that ended up in a lower position, moving from the very high to the high EGDI group, for the reason noted above for Lebanon.

In Oceania, all 14 countries maintained their 2018 EGDI group positions in 2020.

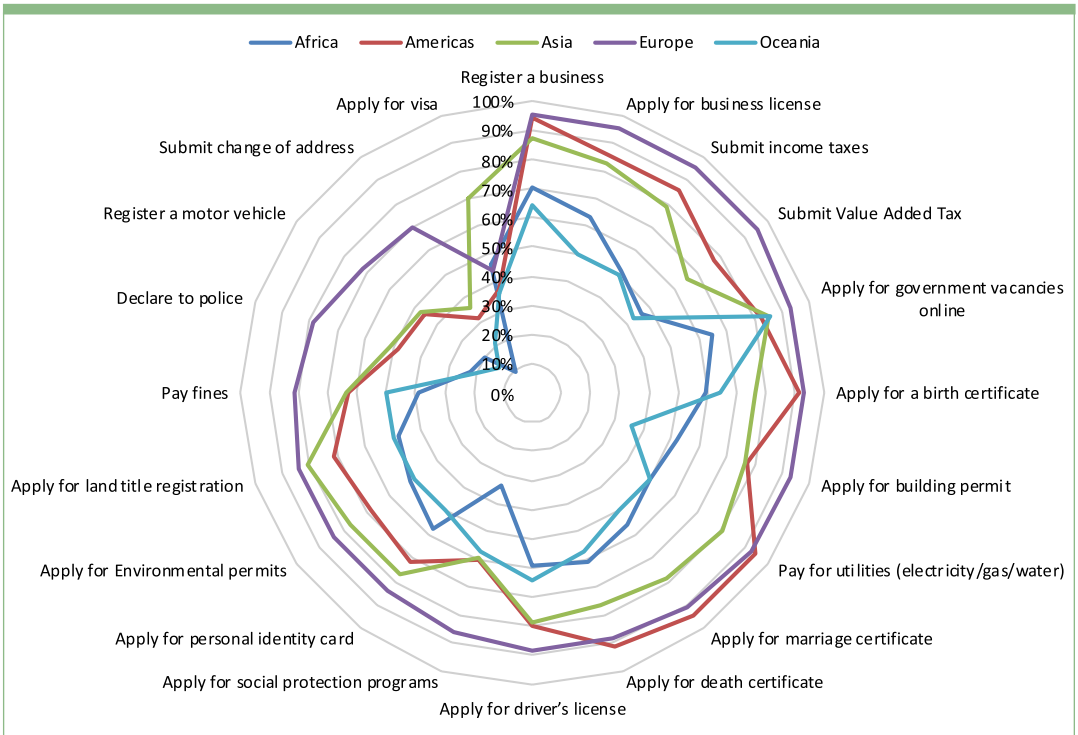
Figure 2.5 presents an infographic of country movement between EGDI groups in each region.

2.2.2 Regional performance in online services provision

As explained in the previous chapter, the OSI component of the EGDI evaluates the provision of online services by Governments. The 2020 Survey assessed the availability of 20 types of online transactional services on government portals (see chapter 1, section 1.6). The results show that the total number of Member States offering at least one online service increased from 140 in 2018 to 162 in 2020, or by 16 per cent.

At the regional level, online services provision varies in both scope and prevalence. Figure 2.6 provides a visual snapshot of the percentage of countries in every region offering each of the 20 services assessed in the Survey. The numbers and proportions of countries offering the different types of services in each region are also listed in the annexes.

Figure 2.6 Percentage of countries in each region offering online services, 2020



Source: 2020 United Nations E-Government Survey.

As evident from the figure, between 88 and 95 per cent of European countries offer half of the 20 online services assessed, and more than 70 per cent of the countries provide all of the services—with the exception of online visa applications, which are offered by only 44 per cent of European countries.

Online services provision in other regions is expanding rapidly. In the Americas and Asia, more than 60 per cent of countries offer 16 of the 20 online services assessed in the Survey. In Africa and Oceania, 50 per cent of countries offer 12 to 14 types of online services.

In Africa, registering a business and applying for a business licence online are services offered by 65-70 per cent of countries. Applying for government vacancies and requesting birth/death/marriage certificates are also common online services in Africa, offered by more than 55 per cent of countries. The least prevalent online service in Africa is submitting a change of address, with only 9 per cent of countries offering this option.

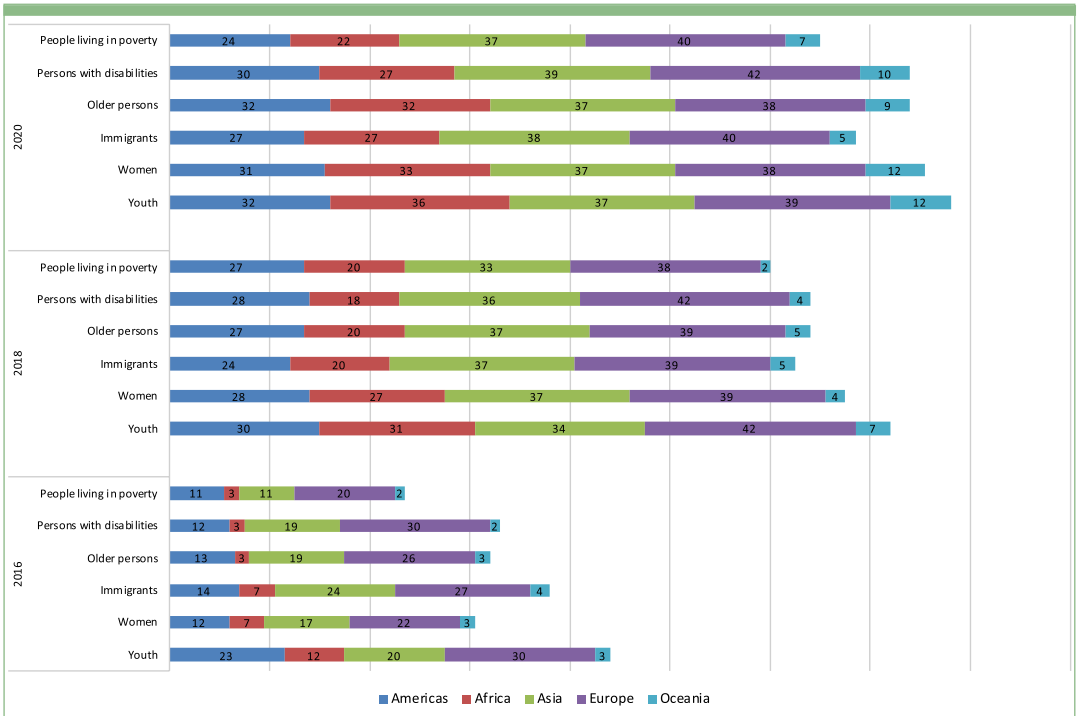
In the Americas, the most popular online services—offered by up to 94 per cent of countries—are registering a business, paying for utilities, and applying for marriage/birth/death certificates. Applying for a visa and submitting a change of address online are the least prevalent services in this region.

In Asia, around 90 per cent of countries offer business registration and business licence application services online. Applying for government vacancies and paying for utilities online are the next two most popular services, respectively offered by 85 and 81 per cent of countries in the region. The least prevalent online services (offered by less than 50 per cent of Asian countries) are registering a motor vehicle and submitting a change of address.

In Oceania, the most commonly offered online service is applying for government vacancies (86 per cent), and the least prevalent is registering a motor vehicle (14 per cent). Actually, online motor vehicle registration is one of the least offered options in every region (20 per cent of countries in Africa, 46 per cent in the Americas, 47 per cent in Asia, and 72 per cent in Europe).

In all regions, the most notable increases in the provision of online services over the past two years have been in registering a business, applying for a birth/marriage certificate, applying for a driver's license, and applying for a personal identity card.

Figure 2.7 Number of countries providing online services for vulnerable groups, 2016, 2018 and 2020



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

Europe has the largest proportion of countries offering services to vulnerable populations (93 per cent), followed by the Americas (84 per cent), Asia (80 per cent), Oceania (65 per cent) and Africa (55 per cent) (see figure 2.7 and subsection 1.7.1 of chapter 1). It should be noted, however, that while most countries provide services for youth, people living in poverty and persons with disabilities appear to be less well served in online services provision.

The progress made in online services provision in every region is encouraging. The fact that average OSI values often exceed average TII values offers acknowledgement of the advances made in the provision of online services; however, this also points to the relative inadequacy of infrastructure development in many areas. Digital divides within and between countries continue to present challenges in Africa, the Americas, Asia and Oceania, with countries in special situations suffering the most. More than 70 per cent of countries in Africa, 51 per cent in the Americas, 43 per cent in Asia, and 86 per cent in Oceania are LDCs, LLDCs and/or SIDS. More than 83 per cent of countries in Africa are low- or lower-middle-income economies, as are 14 per cent of countries in the Americas, 43 per cent in Asia, and 36 per cent in Oceania. These circumstances pose additional challenges and may deepen the digital divides within and between countries and regions. Insights on the relationship between EGDI values and gross national income levels are provided in chapter 1.

2.2.3 Africa: country grouping analysis

Prior to 2020, countries were grouped only according to EGDI level (very high, high, middle or low). Starting with this edition of the Survey, each of the EGDI groups is further divided into four equally defined intervals—rating classes or quartile subgroups—to offer better insight into the situations of countries with similar levels of performance (see chapter 1 and the annexes for details).

Table 2.1 displays the key Survey results for the 14 countries in Africa with the highest EGDI values in 2020. These countries are in the high EGDI group and, in descending order, are further divided into HV, H3, H2 and H1 rating classes. As was the case in 2018, only four countries (Mauritius, Seychelles,

Table 2.1 Countries in Africa with the highest EGDI values

Table : Top countries for e-government in Africa								
Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Mauritius	HV	63	Eastern Africa	0.7000	0.7911	0.6677	0.7196	0.6678
Seychelles	H3	76	Eastern Africa	0.6176	0.7660	0.6925	0.6920	0.6163
South Africa	H3	78	Southern Africa	0.7471	0.7371	0.5832	0.6891	0.6618
Tunisia	H3	91	Northern Africa	0.6235	0.6974	0.6369	0.6526	0.6254
Ghana	H2	101	Western Africa	0.6353	0.5930	0.5596	0.5960	0.539
Namibia*	H2	104	Southern Africa	0.5235	0.6558	0.5447	0.5747	0.4554
Morocco	H2	106	Northern Africa	0.5235	0.6152	0.5800	0.5729	0.5214
Cabo Verde*	H2	110	Western Africa	0.5000	0.6337	0.5476	0.5604	0.498
Egypt*	H1	111	Northern Africa	0.5706	0.6192	0.4683	0.5527	0.488
Gabon*	H1	113	Middle Africa	0.3235	0.6719	0.6250	0.5401	0.4313
Botswana*	H1	115	Southern Africa	0.3647	0.6911	0.5591	0.5383	0.4253
Kenya*	H1	116	Eastern Africa	0.6765	0.5812	0.3402	0.5326	0.4541
Algeria*	H1	120	Northern Africa	0.2765	0.6966	0.5787	0.5173	0.4227
Zimbabwe*	H1	126	Eastern Africa	0.5235	0.6135	0.3688	0.5019	0.3692

* Countries that moved from the middle to the high EGDI group in 2020.

Source: 2020 United Nations E-Government Survey.

South Africa and Tunisia) are among the top 100 countries in terms of overall EGDI ranking, with values above the global average of 0.60.

Mauritius is in the highest (HV) rating class of the high EGDI group and remains the regional front-runner in e-government development. Next are Seychelles, South Africa and Tunisia, all of which are in the H3 rating class. While most of the countries in the region are still part of the middle EGDI group, eight countries (Namibia, Cabo Verde, Egypt, Gabon, Botswana, Kenya, Algeria and Zimbabwe) moved from the middle to the high EGDI group in 2020. The growing number of African countries in the high group supports the assertion that the region is undergoing a digital transformation. The upward movement in EGDI rankings is driven mainly by the increased investment in infrastructure and online services provision (reflected in higher average TII and OSI values). These trends are encouraging for the digitalization of the region.

It would be interesting to explore whether the progress made in e-government development in Africa is part of a strategic structural transformation aimed at bringing tangible and sustainable benefits to the region or simply the product of important local initiatives.

As noted previously, Africa has the highest proportion of countries that have moved to a higher EGDI level. This upward trend derives mainly from the expansion of online services provision across the region (reflected in the 0.0071 point increase in the average OSI value), the improvement in the

Box 2.1 Progress in e-government development in Rwanda, Uganda and the United Republic of Tanzania

Although Rwanda, Uganda and the United Republic of Tanzania are LDCs and/or LLDCs with poorly developed infrastructure, their online services provision is well developed in comparison with most other countries in Africa. Their success derives in part from the fact that they all have comprehensive digital government strategies supported by forward-looking digital government plans aligned with their national policies and the Sustainable Development Goals.

In **Rwanda**, the Vision 2050 strategy and the Smart Rwanda Master Plan place strong emphasis on creating a prosperous and knowledgeable society through the use of smart information and communications technology (ICT) strategies. The Rwandan Information Society Authority also promotes innovation and the adoption of frontier technologies in the public sector. Despite limited resources, the country has made great strides in offering public services online, and most public officials use ICT and the Internet extensively in their everyday work. The e-government platform supports two-way communication, not only providing e-services updates but also allowing people to request information and voice their concerns directly.

In 2019, the **United Republic of Tanzania** established the e-Government Authority with a mandate to coordinate, promote and enforce e-Government policies in order to facilitate public access to digital services. The country requires that online services provision be tracked and measured so that the progress and impact of e-government development can be assessed, and every public institution collects statistics on the usage of e-government services through their respective websites or portals. The United Republic of Tanzania embraces a public-private partnership approach to e-government implementation and works closely with private sector and regional institutions on the adoption of new technologies.

Uganda has a robust legal framework for digital government that includes comprehensive provisions relating to open government data and data protection. The country's e-Government Master Plan is updated every two years based on nationwide surveys. The strategy focuses on enhancing ICT usage in businesses and public institutions; this includes public services delivery, for which it is mandatory that every government entity has its own online portal.

Sources: 2020 Member States Questionnaires for Rwanda, the Republic of Tanzania and Uganda; Rwanda, Voluntary National Review (2019), available at https://sustainabledevelopment.un.org/content/documents/23432Rwanda_VNR_Document__Final.pdf; and https://www.ega.go.tz/publications.

average TII value (by 0.1171 points), and the 28 per cent increase in mobile phone subscriptions per 100 inhabitants (see annex).

Notwithstanding the notable progress made, the region continues to face gaps in infrastructure and human capital development and has experienced a 22 per cent decline in fixed (wired) broadband coverage (see annex). Africa is also home to the largest number of countries in special situations; 38 of the region's countries are LDCs, LLDCs and/or SIDS. There are promising examples of countries that offer online services above the average despite being landlocked and/or least developed, as presented in Box 2.1 illustrating the progress in Rwanda, Uganda and Tanzania. Nevertheless, the average EGDI value for Africa (0.3914) is below the world average of 0.60.

2.2.4 The Americas: country grouping analysis

The countries with the highest EGDI values in the Americas region are listed in table 2.2. Seven of the countries are in the very high EGDI group, with the United States ranked highest (and the only member of the VH rating class), followed by Uruguay and Canada (V3), Argentina and Chile (V2), and Brazil and Costa Rica (V1). Three countries in South America (Argentina, Brazil and Chile) and one country in Central America (Costa Rica) have moved up from the high to the very high EGDI group, bringing the number of South and Central American countries in this category to seven (up from three in 2018) and further reducing the e-government development gap with Northern America.

Table 2.2 Countries in the Americas with the highest EGDI values

Table : Top countries in e-government in the Americas								
Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
United States of America	VH	9	Northern America	0.9471	0.7911	0.9182	0.9297	0.8769
Uruguay	V3	26	South America	0.8412	0.7660	0.8574	0.8500	0.7858
Canada	V3	28	Northern America	0.8412	0.7371	0.7818	0.8420	0.8258
Argentina*	V2	32	South America	0.8471	0.6974	0.7265	0.8279	0.7335
Chile*	V2	34	South America	0.8529	0.5930	0.7606	0.8259	0.735
Brazil*	V1	54	South America	0.8706	0.6558	0.6522	0.7677	0.7327
Costa Rica*	V1	56	Central America	0.6824	0.6152	0.7475	0.7576	0.7004
Mexico	HV	61	Central America	0.8235	0.6337	0.5910	0.7291	0.6818
Barbados	HV	62	Caribbean	0.5765	0.6192	0.7523	0.7279	0.7229
Colombia	HV	67	South America	0.7647	0.6719	0.6122	0.7164	0.6871
Peru	HV	71	South America	0.7529	0.6911	0.5780	0.7083	0.6461
Bahamas	HV	73	Caribbean	0.6765	0.5812	0.6739	0.7017	0.6552
Ecuador	HV	74	South America	0.8118	0.6966	0.5133	0.7015	0.6129

* Countries that moved from the high to the very high EGDI group or from the middle to the high EGDI group in 2020.

Source: 2020 United Nations E-Government Survey.

The six countries with high EGDI values (Mexico, Barbados, Colombia, Peru, Bahamas and Ecuador) are already in the highest (HV) rating class and are thus relatively close to transitioning to the very high EGDI group.

Five countries in the region (Saint Lucia, Jamaica, Guatemala, Suriname and Nicaragua) moved from the middle to the high EGDI group, and there are now only five countries (Guyana, Belize, Honduras, Cuba and Haiti) remaining in the middle EGDI group.

In the Americas, 86 per cent of the 35 countries surveyed are in the high or very high EGDI group in 2020, signifying steady progress in e-government development since 2018. During the past two years, the average EGDI value in the Americas has increased from 0.5898 to 0.6341. While the region is home to 16 SIDS, the overall e-government development performance of these countries (0.5644) is better than the average for the SIDS group as a whole (0.5255). Given these results, it is reasonable to assume that most of the SIDS in the Americas have benefited from the common regional approach governing e-government applications and services and from South-South cooperation. Box 2.2 provides insights on some important characteristics of SIDS in the Caribbean and the Pacific.

The countries in the Americas with the sharpest increase in EGDI values are Paraguay, the Dominican Republic, Argentina and Ecuador. Haiti (ranked 180th) is the only country in this group with low OSI and TII values (0.1882 and 0.2449, respectively)—reflecting its continuing struggle to restore its telecommunications infrastructure after having been hit by natural disasters.

Box 2.2 Countries progressing rapidly in the Americas: Argentina, Brazil, Chile and Costa Rica

Argentina, Brazil, Chile and Costa Rica significantly improved their EGDI values between 2018 and 2020 and transitioned to the very high EGDI group. In all of these countries, the progress made reflects sustained efforts to create and implement comprehensive national e-government strategies, the evolution of supportive legal frameworks, and high levels of cooperation with regional and international actors in relevant digital fields.

The Digital Agenda of **Argentina** is focused on creating a strong technology-driven institutional and governance framework supported by initiatives aimed at accelerating the digital transformation. For instance, the implementation of the Electronic Document Management ecosystem across the Government ensures the greatest possible automation of digital processes in public services delivery. The strong social media presence of the Government further promotes the use of online public services and allows for direct engagement with people to obtain feedback on their level of satisfaction with the services.

Brazil has prioritized the digital transformation of both the government and the economy. The country's Digital Governance Strategy is behind the digital transformation of the public sector, whereas the Brazilian Digital Transformation Strategy (E-Digital) deals with the transformation of the economy. The country has also activated policy frameworks for digital inclusion and participation through regular consultations with individuals and civil society, and it has improved access to public data and information. Brazil has been an active member of the International Digital Cooperation project with the E-Governance Academy in Estonia, which aims to develop a secure, rights-based international digital sphere.

In **Costa Rica**, the National Digital Strategy and similar mechanisms are focused on improving human capital and digital literacy. To this end, the country has established cooperation initiatives and policy integration within various government agencies and actively collaborates with other Latin American Governments to share best practices, resources and efforts to drive e-government strategies.

Among the factors driving e-government development in **Chile** are the improved telecommunications infrastructure (and the accompanying expansion of high-speed broadband into remote areas of the country) and the high level of penetration of mobile devices and mobile Internet. Chile is also committed to supporting international and regional cooperation in digital government development. In 2019, for instance, Chile participated in the OECD E-Leaders Network and contributed to the Digital Agenda for Latin America and the Caribbean (eLAC).

Sources: Member States Questionnaires for Argentina, Brazil, Costa Rica and Chile; Costa Rica, Ministry of Science, Technology and Telecommunications, *Digital Transformation Strategy: The Bicentennial of Costa Rica, 2018-2022* (San José, Costa Rica, 2019), available at https://micit.go.cr/sites/default/files/TransfDigitalCR%20(versi%C3%B3n%20ingl%C3%A9s)%20(impreso)%20versi%C3%B3n%2030-01-2020%20FINAL.pdf.

2.2.5 Asia: country grouping analysis

The top 15 countries in Asia are in the very high EGDI group (see table 2.3). As reported in chapter 1, the Republic of Korea, Singapore and Japan are in the highest (VH) rating class and are among the global leaders in e-government development (see box 2.3). Seven of the leading Asian countries (China, Kuwait, Malaysia, Oman, Saudi Arabia, Thailand and Turkey) joined the very high EGDI group for the first time in 2020.

Table 2.3 Countries in Asia with the highest EGDI values

Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Republic of Korea	VH	2	Eastern Asia	1.0000	0.8997	0.9684	0.9560	0.901
Singapore	VH	11	South-Eastern Asia	0.9647	0.8904	0.8899	0.9150	0.8812
Japan	VH	14	Eastern Asia	0.9059	0.8684	0.9223	0.8989	0.8783
Cyprus	V3	18	Western Asia	0.8706	0.8429	0.9057	0.8731	0.7736
United Arab Emirates	V3	21	Western Asia	0.9000	0.7320	0.9344	0.8555	0.8295
Kazakhstan	V3	29	Central Asia	0.9235	0.8866	0.7024	0.8375	0.7597
Israel	V2	30	Western Asia	0.7471	0.8924	0.8689	0.8361	0.7998
Bahrain	V2	38	Western Asia	0.7882	0.8439	0.8319	0.8213	0.8116
Saudi Arabia*	V2	43	Western Asia	0.6882	0.8648	0.8442	0.7991	0.7119
China*	V1	45	Eastern Asia	0.9059	0.7396	0.7388	0.7948	0.6811
Kuwait*	V1	46	Western Asia	0.8412	0.7470	0.7858	0.7913	0.7388
Malaysia*	V1	47	South-Eastern Asia	0.8529	0.7513	0.7634	0.7892	0.7174
Omana*	V1	50	Western Asia	0.8529	0.7751	0.6967	0.7749	0.6846
Turkey*	V1	53	Western Asia	0.8588	0.8287	0.6280	0.7718	0.7112
Thailand*	V1	57	South-Eastern Asia	0.7941	0.7751	0.7004	0.7565	0.6543

* Countries that moved from the high to the very high EGDI group in 2020.

Source: 2020 United Nations E-Government Survey.

Asia increased its average EGDI value from 0.5779 in 2018 to 0.6373 in 2020, or by 10 per cent, becoming the second most advanced region in e-government development. The improvement was driven primarily by infrastructure development (reflected in a 26 per cent increase in the average TII value for the region).

While Asian countries perform well as a group, their individual levels of e-government development are highly diverse; this region has the widest variance in EGDI values (see figure 2.3). Asia is home to countries with some of the highest EGDI rankings, such as the Republic of Korea (2nd), Singapore (11th) and Japan (14th) but also includes countries with significantly lower rankings, including Lao People's Democratic Republic (167th), Afghanistan (169th), Yemen (173rd) and Democratic People's Republic of Korea (187th).

Asia has further distinguished itself in 2020 as the region with the highest number of countries that improved their EGDI rank by more than 15 positions. While analysts and policymakers should be cautioned against misinterpreting changes in rankings among countries in the same rating class (see chapter 1, section 1.4), these significant upward shifts in ranking can serve as a proxy for tracking digital development. The Asian countries that experienced such shifts include Bhutan (up 23 positions [+23]), Cambodia (+21), Syrian Arab Republic (+21), China (+20), Armenia (+19), Indonesia (+19), Cyprus (+18) and Thailand (+16).

As part of the Asia region, the member countries of the Cooperation Council for the Arab States of the Gulf (GCC) share similarities in their e-government development and are thus grouped together in table 2.4.

Box 2.3 E-government development front-runners in Asia

The Republic of Korea, Singapore and Japan are the best performers in Asia and, with respective EGDI rankings of 2, 11 and 14, are among the global leaders in e-government development.

The **Republic of Korea** is the world leader in online services provision (with an OSI value of 1.000) and has the highest EGDI value in Asia. National e-government strategies are adopted every five years and are supported by sectoral development plans. The e-Government 2020 Master Plan ensures that national policy is evidence-based and grounded in science and is focused on achieving open, innovative government for citizens. In addition, the Intelligent Government Master Plan creates a framework for the development and utilization of artificial intelligence (AI) and data for innovation in public administration and the proactive provision of citizen-driven services designed to accommodate the specific needs of people, especially those of the most vulnerable groups. The intelligent government implementation strategy is reflected in the Data and AI Economy Facilitation Plan, which focuses on strengthening data and AI capacities in order to build a strong foundation for the development of a sustainable digital economy. National mechanisms such as the Master Plan for Blockchain Industry Development, the Smart City Implementation Strategy, and the New Industry and Technology Roadmap are facilitating the acceleration of new technology development for the benefit of society and improved public administration. In addition to these ongoing initiatives, the Government provides platforms for e-participation (e-People), open data (data.go.kr) and e-procurement (KONEPS). The country's legal framework for e-government focuses on the protection of personal data and information and on digital security and digital identity (see the 2017 Digital Signature Act).

In **Singapore**, the Government Technology Agency is responsible for the development and implementation of national inter-agency e-government strategies and services. In 2014, Singapore launched the Smart Nation initiative, of which digital government is an integral part. In 2018, the Digital Government Blueprint was developed to better leverage data, harness new technologies, and drive broader efforts to build a digital economy and digital society in support of the Smart Nation strategy. Singapore has a one-stop-shop government portal (Gov.sg) that provides access to specialized portals servicing e-participation (reach.gov.sg), e-services (citizenconnectcentre.sg), open data (data.gov.sg), and public procurement (gebiz.gov.sg). The Government has also created digital platforms for citizens so that they can plan and monitor their social security savings or report issues with government services. In terms of legal mechanisms relating to e-government, the country has adopted the 2012 Personal Data Protection Act as well as legislation on cybersecurity outlining various obligations for ensuring that appropriate measures are in place to prevent, manage and respond to cybersecurity threats and incidents.

In **Japan**, the Government Digital Transformation Plan centres around the use of new technologies and the development of human resources to strengthen governance and improve the lives of citizens. The country is shaping its new administrative image in the digital age by, among other things, optimizing IT investment, implementing procurement reforms, and facilitating the activation of the national digital government plan at the municipal level. The Council for Science, Technology and Innovation is working on a number of e-government initiatives aimed at facilitating information sharing and dissemination and supporting business development in the country. Japan has a central portal for digital government (e-gov.go.jp), as well as additional e-government platforms for e-participation (e-Testimony), open data (data.go.jp) and public procurement (geps.go.jp). The legal framework for e-government focuses on personal digital security and access to digital data (relevant legislation includes the Act on the Protection of Personal Information, the Act on Electronic Signatures and Certification Business, the Act on Access to Information Held by Administrative Organs, and the Act on Access to Information Held by Incorporated Administrative Agencies).

Sources: Member States Questionnaires for the Republic of Korea, Singapore and Japan.

Box 2.4 China: embracing digital transformation

China is one of the seven Asian countries that joined the very high EGDI group for the first time in 2020. The country's progress can be attributed in part to the implementation of comprehensive digital government policies and initiatives at both the national and subnational levels. A firm commitment to the development of "smart cities" first appeared in the Report on the Work of the Government in 2015, and as developing digital government is an important part of this initiative, municipalities have been racing to set up their digital government portals. The Shanghai Government Data Service Portal is one of the local projects that has been most successful in providing one-stop public services.

Simultaneously, China is actively incorporating frontier technologies such as big data, AI and 5G into digital government to enhance the efficiency of public sector management and service delivery. In 2020, the Government announced its intention to establish a government information resource sharing system using blockchain technology.

Social media applications have also been smartly utilized as digital tools to connect people, businesses and the Government. The most notable examples are WeChat and Alipay, which allow individuals to access public services through their smartphones. The Government is also establishing official accounts on social media to facilitate direct interaction with the public. Public authorities are increasingly using social media as a tool for crisis management; during the outbreak of COVID-19, members of the public used Alipay to report their health status and emergencies.

Sources: 2020 Member States Questionnaire for China; China, "Full text: Report on the Work of the Government (2015)", available at http://english.www.gov.cn/archive/publications/2015/03/05/content_281475066179954.htm; UNDP China, *Smart Cities and Social Governance: Guide for Participatory Indicator Development* (Beijing, 2017), available at https://www.undp.org/content/dam/china/docs/Publications/Smart%20Cities%20and%20Social%20Governance-EN.pdf.

Table 2.4 E-government development in the member countries of the Cooperation Council for the Arab States of the Gulf (GCC)

Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
United Arab Emirates	V3	21	Western Asia	0.9000	0.7320	0.9344	0.8555	0.8295
Bahrain	V2	38	Western Asia	0.7882	0.8439	0.8319	0.8213	0.8116
Saudi Arabia*	V2	43	Western Asia	0.6882	0.8648	0.8442	0.7991	0.7119
Kuwait*	V1	46	Western Asia	0.8412	0.7470	0.7858	0.7913	0.7388
Oman*	V1	50	Western Asia	0.8529	0.7751	0.6967	0.7749	0.6846
Qatar	HV	66	Western Asia	0.6588	0.6698	0.8233	0.7173	0.7132

* Countries that moved from the high to the very high EGDI group in 2020.

Source: 2020 United Nations E-Government Survey.

Five of the six GCC countries are in the very high EGDI group; the United Arab Emirates is ranked highest and is part of the V3 rating class, followed by Bahrain and Saudi Arabia (both V2) and Kuwait and Oman (both V1). The latter three countries moved up to the very high EGDI group in 2020, with Saudi Arabia advancing directly to the higher V2 rating class. Qatar is in the highest (HV) rating class of the high EGDI group.

2.2.6 Europe: country grouping analysis

As a region, Europe has the most homogeneous e-government development (see figure 2.5) and has topped the global charts since the inception of the E-Government Survey. It has the highest average EGDI value (0.8170) and the most highly developed infrastructure (with an average TII value of 0.8162). Of the 43 European countries surveyed, 33 are in the very high EGDI group (see table 2.5); eight of the latter (Denmark, Estonia, Finland, Sweden, United Kingdom of Great Britain and

Table 2.5 Countries in Europe with the highest EGDI values

Country	Rating class	EGDI Rank	Sub-Region	EU Group	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Denmark	VH	1	Northern Europe	Yes	0.9706	0.9588	0.9979	0.9758	0.915
Estonia	VH	3	Northern Europe	Yes	0.9941	0.9266	0.9212	0.9473	0.8486
Finland	VH	4	Northern Europe	Yes	0.9706	0.9549	0.9101	0.9452	0.8815
Sweden	VH	6	Northern Europe	Yes	0.9000	0.9471	0.9625	0.9365	0.8882
United Kingdom of Great Britain and Northern Ireland	VH	7	Northern Europe	No (**)	0.9588	0.9292	0.9195	0.9358	0.8999
Netherlands	VH	10	Western Europe	Yes	0.9059	0.9349	0.9276	0.9228	0.8757
Iceland	VH	12	Northern Europe	No	0.7941	0.9525	0.9838	0.9101	0.8316
Norway	VH	13	Northern Europe	No	0.8765	0.9392	0.9034	0.9064	0.8557
Austria	V3	15	Western Europe	Yes	0.9471	0.9032	0.8240	0.8914	0.8301
Switzerland	V3	16	Western Europe	No	0.8294	0.8946	0.9482	0.8907	0.852
Spain	V3	17	Southern Europe	Yes	0.8882	0.8989	0.8531	0.8801	0.8415
France	V3	19	Western Europe	Yes	0.8824	0.8612	0.8719	0.8718	0.879
Lithuania	V3	20	Northern Europe	Yes	0.8529	0.9218	0.8249	0.8665	0.7534
Malta	V3	22	Southern Europe	Yes	0.8118	0.8290	0.9232	0.8547	0.8011
Slovenia	V3	23	Southern Europe	Yes	0.8529	0.9256	0.7853	0.8546	0.7714
Poland	V3	24	Eastern Europe	Yes	0.8588	0.9001	0.8005	0.8531	0.7926
Germany	V3	25	Western Europe	Yes	0.7353	0.9362	0.8856	0.8524	0.8765
Ireland	V3	27	Northern Europe	Yes	0.7706	0.9494	0.8100	0.8433	0.8287
Liechtenstein	V2	31	Western Europe	No	0.6588	0.8489	1.0000	0.8359	0.8204
Luxembourg	V2	33	Western Europe	Yes	0.7647	0.8097	0.9072	0.8272	0.8334
Portugal	V2	35	Southern Europe	Yes	0.8353	0.8463	0.7948	0.8255	0.8031
Russian Federation	V2	36	Eastern Europe	No	0.8176	0.8833	0.7723	0.8244	0.7969
Italy	V2	37	Southern Europe	Yes	0.8294	0.8466	0.7932	0.8231	0.8209
Czech Republic*	V2	39	Eastern Europe	Yes	0.7235	0.9030	0.8140	0.8135	0.7084
Belarus	V2	40	Eastern Europe	No	0.7059	0.8912	0.8281	0.8084	0.7641
Belgium	V2	41	Western Europe	Yes	0.6588	0.9521	0.8033	0.8047	0.808
Greece	V2	42	Southern Europe	Yes	0.7059	0.8905	0.8100	0.8021	0.7833
Bulgaria*	V1	44	Eastern Europe	Yes	0.7706	0.8408	0.7826	0.7980	0.7177
Slovakia*	V1	48	Eastern Europe	Yes	0.7176	0.8286	0.7988	0.7817	0.7155
Latvia*	V1	49	Northern Europe	Yes	0.5824	0.9172	0.8399	0.7798	0.6996
Croatia*	V1	51	Southern Europe	Yes	0.7529	0.8414	0.7293	0.7745	0.7018
Hungary*	V1	52	Eastern Europe	Yes	0.7471	0.8509	0.7255	0.7745	0.7265
Romania*	V1	55	Eastern Europe	Yes	0.7235	0.7995	0.7586	0.7605	0.6671

* Countries that moved from the high to the very high EGDI group in 2020.

(**) Seceded from the EU

Source: 2020 United Nations E-Government Survey.

Northern Ireland, Netherlands, Iceland and Norway) are in the highest (VH) rating class and are among the global leaders in e-government development. Box 2.5 provides some insights on policy frameworks and initiatives contributing to Europe's digital transformation.

Box 2.5 Digital Transformation in Europe

Denmark's Digitization Strategy focuses on creating a central ICT infrastructure that links the national government agencies, local government and municipalities to common services and a range of initiatives, projects and solutions such as digital infrastructure, data reuse, data security, digital welfare and digital business solutions. Denmark has different specialized portals for citizens and businesses as well as one national health portal. Recently, the government has launched a series of more specific digital strategies, such as the National Strategy for AI. As part of the strategy, the government has proposed a new investment fund to expedite the dissemination of digital welfare solutions through AI solutions. The government intends to launch also several signature projects in health sector, the social and employment areas, and introduce cross-sector case processing. Denmark works closely with the regional body on digital transformation Nordic Council.

Estonia is considered one of the fastest raising countries for digital transformation in the world. The citizens in Estonia can do basically anything online except for a very few things like getting married or divorced and selling or buying real estate. The X-road, a multi-channel communication protocol developed for the entire online service provision, secures functions such as digital identity, e-voting, e-taxation, and e-businesses, to name a few. Eesti.ee is the one-stop-shop to government information and e-services. The country has also a Civil Society Development Strategy that includes citizens in the development of policies and legal acts. For example, the Citizen Initiative Portal rahvaalgatus.ee enables citizens to write proposals, hold discussions, compose and send digitally signed collective addresses to the Estonian Parliament.

Finland aims to build a human-centric, digital society in a secure and ethical way with all public services digitally accessible by 2023. The country envisages contributions from the local government, municipalities, businesses, academia and civil society and gives priority to increased efficiency, effectiveness and productivity in the whole public sector. The Government has a centralized multi-channel one-stop-shop portal thus improving everyone's access to digital services on an equal basis. The platform is linked with other specialized portals such as the one for e-participation, open government data and e-taxation. The Finnish Digitalisation programme, currently under the oversight of the Ministry of Finance with a Director General for ICT in Public Sector, manages cross-agency e-government strategies.

Sweden substantially enhanced its technical infrastructure and, in its strategy, focuses on five priorities: digital skills, digital innovation, digital security, digital leadership and digital infrastructure. To put these priorities into action, a Digitalization Council has been set up at the Swedish Post and Telecom Authority. The Government.se is the official national portal connected with a variety of other e-Government portals and services hosted by different Ministries. The OGD portal provides extensive datasets and information to ensure data accessibility and transparency of all public services for citizens. The National Agency for Public Procurement provides all its services to citizens and businesses digitally. Sweden identifies AI and new technologies as a crucial catalyst for innovation, for implementing the SDGs, combatting climate change and providing new job opportunities to citizens.

The United Kingdom of Great Britain and Northern Ireland has developed the "gov.uk" portal based on the "build once and re-use" principle, a concept that has become one of the most popular whole-of-government conceptual frameworks for service provision in the world. In February 2017, the country launched a new citizen-centric Government transformation strategy 2017-2020, complemented by a strong legal framework. It ensures that all citizens have access to e-Government services with personalized digital identities while also protecting their data privacy through The Data Protection Act 2018 and the EU GDPR. In 2019, the Government has published the Technology Innovation Strategy, which establishes a roadmap for government innovation through emerging technologies constantly refined alongside with rapidly changing technology landscape. In 2019 DGS and the Office for Artificial Intelligence (OAI) of the UK has published also a guidance on the use of artificial intelligence in the public sector.

Sources: Member States Questionnaires

Box 2.5 Digital Transformation in Europe (cont'd.)

Iceland's 'Information Society Taskforce' oversees implementation of the highly decentralised, coordinated at central and local level programme on digital transformation. The national e-government portal "Government.is" is linked with the ministries and redirects to several specialized one-stop-shop platforms such as "Island" - a citizen centric portal to access information and large number of public services; the "EUGO: for people who want to start doing business; the "Iceland"- an official gateway for foreigners; and the "Multicultural Information Centre" designed to provide assistance to immigrants. In 2018, the government signed an agreement with the Nordic Institute for Interoperability Solutions to streamline and automate the processes for data exchange using the Estonian X-Road platform already in use in Estonia and Finland.

Norway has made it a legal requirement for both public and private sector to develop a universal ICT infrastructure aiming to modernize, simplify and improve the public sector. Norge.no and Government.no are the national portals to guide citizens to public digital services at all levels of government. Due to decentralized structure in Norway focuses on municipalities and there are also several specialized portals serving different target groups and purposes. For example, Altinn.no is the portal for businesses and citizens to report online to government agencies, the Data.norge.no is for OGD and Anskaffelser.no is for e-procurement. Since 2016 there is a collaboration between all Nordic governments called SmartGovernment focussing on cross-border projects on interoperability, automated flow of data, rules for exchange of business data, and communication and stakeholder engagement. The tax authorities of Norway, Denmark, Iceland, Finland and Sweden operate the Nordisk eTax,- a portal created in collaboration with the Nordic Council of Ministers.

The Netherlands Digital Strategy covers all economic sectors of the country. The country has its own Digital Strategy focusing on ICT development and management of Public Sector, and a common ICT infrastructure that streamlines digital solutions across all institutional levels. A dedicated regulatory framework supporting the investments on digital infrastructures, and a legal framework protecting fundamental rights and public values, are also in place. The Dutch government have a centralized one-stop-shop portal, which provides information about services from all areas of the government. Specific portals are linked and available for e-participation and e-services. Moreover, there is a strong commitment by the government to use new technologies. The Ministry of the Interior is working together with different municipalities to create a Blockchain coalition to design smart cities with an emphasis on increasing public values both in the society and within political system.

Sources: Member States Questionnaires

The ten countries in Europe with comparatively lower EGDI values (averaging 0.6957) are mainly Southern European States.

2.2.7 Oceania: country grouping analysis

All 14 countries in Oceania are listed in table 2.6 owing to the small size of the region. Five countries are in the very high or high EGDI group, and the remainder are in the middle EGDI group. Australia and New Zealand—with respective EGDI values of 0.9053 and 0.8806, regional rankings of 1st and 2nd, and global rankings of 5th and 8th—are in the highest (VH) rating class of the very high EGDI group and are among the world leaders in e-government development. The other countries in the region have an average EGDI value of 0.44—roughly half the corresponding values of the regional front-runners and substantially lower than the global average of 0.60. These 12 countries are all SIDS, and four of them (Kiribati, Solomon Islands, Tuvalu and Vanuatu) are also LDCs.

With the challenges involved in developing the telecommunications infrastructure in these island States (average TII value: 0.2991), Oceania struggles to capitalize on its highly developed human capital (average HCI value: 0.6884) and achieve meaningful progress in e-government development.

In spite of the obstacles presented, Fiji, Tonga and Palau moved up from the middle to the high EGDI group in 2020, and Papua New Guinea and the Solomon Islands transitioned from the low to the middle group, signifying the ability of the region's SIDS to move forward with e-government development even under difficult circumstances.

Table 2.6 Countries in Oceania listed in descending order by EGDI value

Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Australia	VH	5	Australia and New Zealand	0.9471	1.0000	0.8825	0.9432	0.9053
New Zealand	VH	8	Australia and New Zealand	0.9294	0.9516	0.9207	0.9339	0.8806
Fiji	H3	90	Melanesia	0.5059	0.8227	0.6468	0.6585	0.5348
Tonga	H2	108	Polynesia	0.3765	0.8283	0.4800	0.5616	0.5237
Palau	H1	125	Micronesia	0.2765	0.8816	0.3745	0.5109	0.5024
Vanuatu	M3	142	Melanesia	0.3353	0.6012	0.3845	0.4403	0.3990
Kiribati	M3	145	Micronesia	0.4941	0.6778	0.1241	0.4320	0.3450
Samoa	M3	149	Polynesia	0.2647	0.7414	0.2596	0.4219	0.4236
Tuvalu*	M3	151	Polynesia	0.3000	0.6821	0.2807	0.4209	0.3779
Nauru	M3	154	Micronesia	0.1706	0.6006	0.4738	0.4150	0.3324
Marshall Islands*	M3	156	Micronesia	0.3412	0.7506	0.1247	0.4055	0.3543
Micronesia (Federated States of)*	M2	161	Micronesia	0.3529	0.6747	0.1061	0.3779	0.3155
Solomon Islands*	M2	166	Melanesia	0.3235	0.4985	0.2106	0.3442	0.2816
Papua New Guinea	M1	175	Melanesia	0.2235	0.5013	0.1233	0.2827	0.2787

* Countries that moved from the middle to the high EGDI group or from the low to the middle EGDI group in 2020.

Source: 2020 United Nations E-Government Survey.

Box 2.6 E-Government front-runners in Oceania: Australia and New Zealand

Australia has the highest EGDI value in Oceania and is ranked fifth in the world in e-government development. The country's approach to the 2030 Agenda is to integrate the Sustainable Development Goals (SDGs) into national policies, strategies and programmes. In 2018, the Government released its Digital Transformation Strategy, providing a clear vision for the modernization of Australian public services by 2025. The Strategy includes a strong focus on making public agencies user-centric and widening the accessibility of digital services to ensure their availability for all. To embed the national Strategy in subnational and local structures, the country has formed the Australian Digital Council. Australia has investment strategies for a range of emerging technologies underpinned by the National Innovation and Science Agenda and a digital economy strategy set out in Australia's Tech Future. The Australian legal framework ensures that people's digital data are protected and gives them a de facto right to digital government. The country has a central e-government portal that is home to more than 900 Australian government websites. The portal provides a simple and secure way to access online government services such as jobactive (JobSearch.com.au), the Australian Taxation Office (ato.gov.au), Services Australia: Child Support (servicesaustralia.gov.au/individuals/child-support), My Aged Care (myagedcare.gov.au), My Health Record (myhealthrecord.gov.au), and the National Disability Insurance Scheme (ndis.gov.au). The country's commitment to e-participation is reflected in whole-of-government initiatives such as the Open Government Partnership.

Sources: 2020 Member State Questionnaire.

Box 2.6 E-Government front-runners in Oceania: Australia and New Zealand (cont'd.)

New Zealand is the other leading country in Oceania and continues to demonstrate the outstanding EGDI performance reflected in the last two editions of the Survey. New Zealand has a strong domestic and international focus on sustainable development, and the Government is activating the country's SDG commitments by building a more productive, sustainable, inclusive and future-ready economy that will improve the well-being of all. Within its Department of Internal Affairs, New Zealand has a solid leadership and governance structure for e-government that includes the Minister for Government Digital Services, the Government Chief Digital Officer, the Government Chief Data Steward, and the Government Chief Information Security Officer, as well as the Digital Government Partnership and the Digital Council for Aotearoa New Zealand. In 2019, the Government published the Strategy for a Digital Public Service, which identifies a number of key areas in which public services delivery must be modernized for the benefit of the country's people. New Zealand is in the process of consolidating its three main portals for e-Government (digital.govt.nz, govt.nz and ict.govt.nz) into two (digital.govt.nz and govt.nz). Government departments offer additional e-services through their own websites; among these are the Identity and Passports site (passports.gov.nz), the Inland Revenue site (ird.govt.nz), and MyMSD (my.msd.govt.nz); MyMSD is used for checking payments, managing public appointments, communicating changes and applying for benefits. In addition, the Government of New Zealand is part of several public-private partnerships and multistakeholder forums dedicated to improving e-Government, including the Digital Economy and Digital Inclusion Ministerial Advisory Group and the Expert Advisory Panel for the Open Government Partnership. The Government attaches great importance to integrating non-government stakeholders in the discussion on the future of the digital economy and digital inclusion.

Sources: 2020 Member State Questionnaire.

2.3 Countries in special situations

The United Nations has identified three groups of countries in special situations that face specific challenges in their pursuit of sustainable development: least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS).[5] In some cases, these designations overlap.

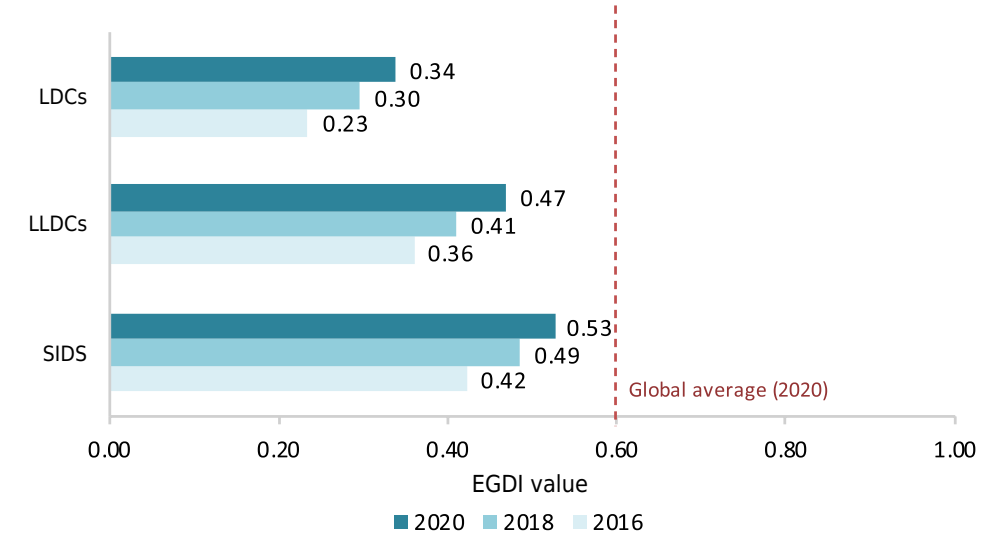
LDCs have weak human and institutional capacities, low and unequally distributed incomes, and a scarcity of domestic financial resources. They often experience governance crises and political instability—and in some cases internal and external conflicts. Presently, there are 47 LDCs in various world regions.

LLDCs face serious constraints to overall socioeconomic development due to the lack of territorial access to the sea, remoteness and isolation from world markets, and high transit costs. There are currently 32 LLDCs—16 in Africa, 12 in Asia, 2 in the Americas, and 2 in Europe.

SIDS are recognized as a distinct group of developing countries with specific social, economic and environmental vulnerabilities. These countries tend to have a narrow resource base; high costs for energy, infrastructure, transportation, communication and services; little resilience to natural disasters; high volatility in economic growth; limited opportunities for the private sector and a proportionately large reliance of their economies on the public sector; and fragile natural environments. There are 38 Member States in this group.

In terms of e-government development, the LDCs, LLDCs and SIDS as a group have increased their average EGDI value by 33 per cent since 2016, which is higher than the average global increase of 22 per cent during the same period. Among these three special groups, the LDCs have made the most progress since 2016, increasing their average EGDI value by around 44 per cent. Nonetheless, the average EGDI values for LDCs, LLDCs and SIDS remain well below the world average (see figure 2.8).

Figure 2.8 Average EGDI values for countries in special situations, 2020



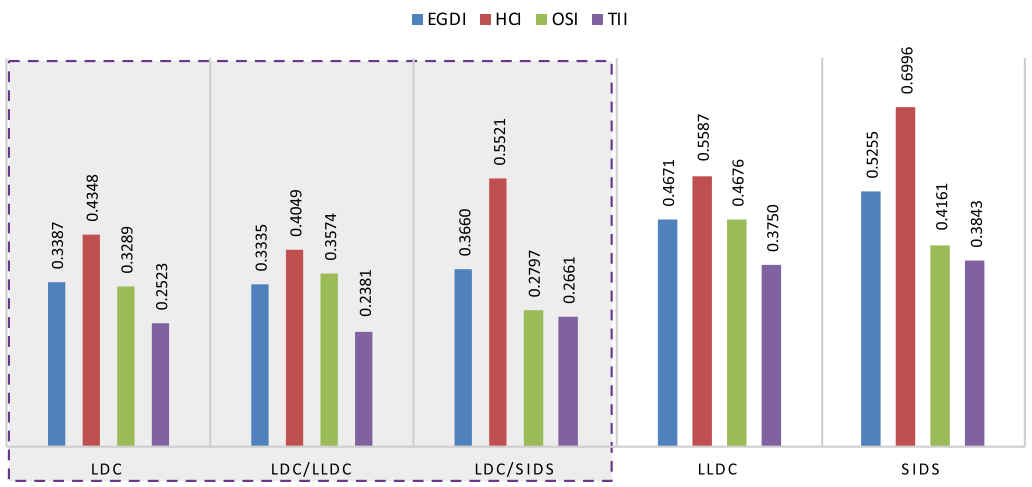
Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

LDCs have the lowest average EGDI value (0.34) among the three special groups, followed by SIDS (0.47) and LLDCs (0.53); all of these groups have average values below the global average of 0.60.

As shown in figure 2.9, the variance in subindex values for countries in special situations is pronounced within distinct rating classes, including LDCs that are landlocked (LDC/LLDCs) and LDCs among the small island developing States (LDC/SIDS). While the average EGDI values for these rating classes are roughly comparable, the Survey results indicate that LDC/SIDS have higher levels of human capital development and slightly better developed infrastructure, while LDC/LLDCs have better developed online services provision.

When LDCs are excluded from the lists of LLDCs and SIDS, the average EGDI values for the latter two groups are higher (0.4671 for LLDCs versus 0.3335 for LDC/LLDCs and 0.5255 for SIDS versus 0.3660 for LDC/SIDS).

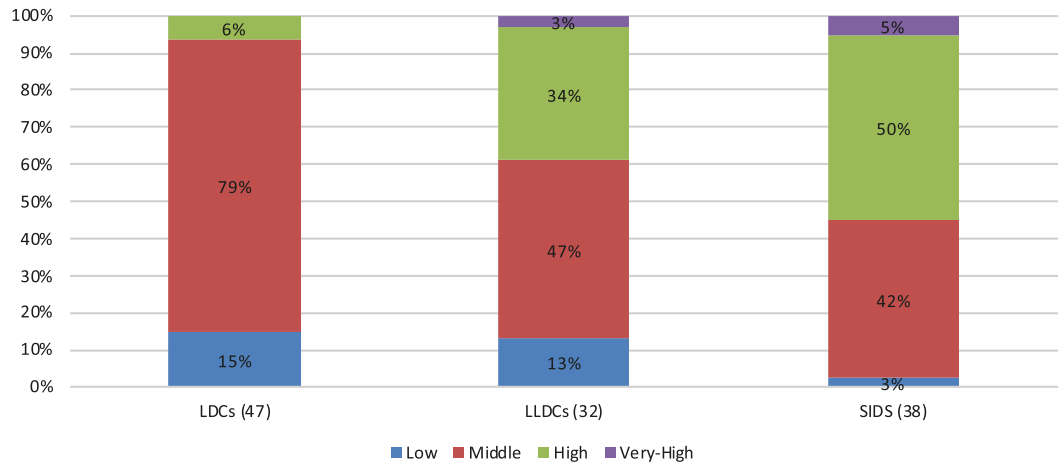
Figure 2.9 EGDI and subindex values for countries in special situations, 2020



Source: 2020 United Nations E-Government Survey.
* The 47 LDCs include 17 LDC/LLDCs and 9 LDC/SIDS, and the 38 SIDS include 9 LDC/SIDS.

LDCs are concentrated in the middle EGDI group (79 per cent) and are not represented in the very high EGDI group (see figure 2.10). Among the LLDCs, 47 per cent have middle EGDI values and 34 per cent have high EGDI values. Half of the SIDS are in the high EGDI group, and 42 per cent are in the middle EGDI group. Only 3 per cent of LLDCs and 5 per cent of SIDS have very high EGDI values.

Figure 2.10 The distribution of countries in special situations among EGDI levels, 2020



Source: 2020 United Nations E-Government Survey.

2.3.1 Least developed countries

There are currently 47 LDCs—33 in Africa, 13 in Asia and the Pacific, and 1 in Latin America. They comprise more than 880 million people (about 12 per cent of the world population) but account for less than 2 per cent of world gross domestic product and about 1 per cent of global trade in goods.

With their transition from the middle to the high EGDI group in 2020, Bhutan, Bangladesh and Cambodia have become the leaders in e-government development among the LDCs; their EGDI values place them within the H2, H1 and H1 rating classes, respectively. Rwanda, Nepal, Timor-Leste, Lesotho and Uganda are in the highest (MH) rating class of the middle EGDI group.

Bhutan, Bangladesh and Rwanda have OSI values that are higher than their respective HCI and TII values, signifying the efforts made by these Governments to advance e-government development in spite of resource limitations. It is important to note that Bhutan is also an LLDC and therefore faces additional challenges.

Among the LDCs, Lesotho and Cambodia have made significant strides in improving their EGDI ranking (each by more than 20 positions), despite being lower-middle-income economies with limited resources. Table 2.7 displays the performance of the highest-ranked LDCs.

2.3.2 Landlocked developing countries

Table 2.8 lists the LLDCs that rank highest in terms of e-government development. Within this category, Kazakhstan has the highest EGDI value (0.8375) and is part of the second-highest (V3) rating class within the very high EGDI group. In 2018, Kazakhstan moved from the high to the very high EGDI group and has continued to accelerate the pace of e-government development within the framework of the Digital Kazakhstan programme, improving the quality and the number of public services provided online, expanding the ICT infrastructure, and enhancing the quality of education and the overall digital literacy of the population.

Table 2.7 Least developed countries with the highest EGDI values

Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Bhutan*	H2	103	Southern Asia	0.6824	0.5139	0.5367	0.5777	0.4274
Bangladesh*	H1	119	Southern Asia	0.6118	0.5731	0.3717	0.5189	0.4862
Cambodia*	H1	124	South-Eastern Asia	0.4529	0.5344	0.5466	0.5113	0.3753
Rwanda	MH	130	Eastern Africa	0.6176	0.5261	0.2931	0.4789	0.4590
Nepal	MH	132	Southern Asia	0.4000	0.5405	0.4691	0.4699	0.4748
Timor-Leste	MH	134	South-Eastern Asia	0.4412	0.5599	0.3935	0.4649	0.3816
Lesotho	MH	135	Southern Africa	0.3529	0.5753	0.4497	0.4593	0.2968
Uganda	MH	137	Eastern Africa	0.5824	0.5395	0.2278	0.4499	0.4055
Vanuatu	M3	142	Melanesia	0.3353	0.6012	0.3845	0.4403	0.3990
Kiribati	M3	145	Micronesia	0.4941	0.6778	0.1241	0.4320	0.3450
Myanmar	M3	146	South-Eastern Asia	0.2588	0.5125	0.5234	0.4316	0.3328
Togo	M3	147	Western Africa	0.5000	0.5373	0.2532	0.4302	0.3989
Zambia	M3	148	Eastern Africa	0.2588	0.6745	0.3394	0.4242	0.4111
Senegal	M3	150	Western Africa	0.4941	0.3332	0.4358	0.4210	0.3486
Tuvalu	M3	151	Polynesia	0.3000	0.6821	0.2807	0.4209	0.3779
United Republic of Tanzania	M3	152	Eastern Africa	0.5529	0.4659	0.2430	0.4206	0.3929
Sao Tome and Principe	M3	155	Middle Africa	0.2471	0.6736	0.3015	0.4074	0.3424

* Countries that have moved from the middle to the high EGDI group.

Source: 2020 United Nations E-Government Survey.

Table 2.8 Landlocked developing countries with the highest EGDI values

Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Kazakhstan*	V3	29	Central Asia	0.9235	0.8866	0.7024	0.8375	0.7597
Armenia	HV	68	Western Asia	0.7000	0.7872	0.6536	0.7136	0.5944
Azerbaijan	HV	70	Western Asia	0.7059	0.7713	0.6528	0.7100	0.6574
North Macedonia	HV	72	Southern Europe	0.7412	0.7395	0.6442	0.7083	0.6312
Republic of Moldova	H3	79	Eastern Europe	0.7529	0.7432	0.5683	0.6881	0.6590
Kyrgyzstan	H3	83	Central Asia	0.6471	0.7873	0.5902	0.6749	0.5835
Uzbekistan	H3	87	Central Asia	0.7824	0.7434	0.4736	0.6665	0.6207
Mongolia	H3	92	Eastern Asia	0.5294	0.8063	0.6135	0.6497	0.5824
Paraguay	H2	93	South America	0.7059	0.6968	0.5435	0.6487	0.5255
Bolivia (Plurinational State of)	H2	97	South America	0.5824	0.7379	0.5184	0.6129	0.5307
Bhutan*	H2	103	Southern Asia	0.6824	0.5139	0.5367	0.5777	0.4274
Botswana*	H1	115	Southern Africa	0.3647	0.6911	0.5591	0.5383	0.4253

* Countries that have moved from the middle to the high EGDI group.

Source: 2020 United Nations E-Government Survey.

Following Kazakhstan are Armenia, Azerbaijan and North Macedonia, which are in the highest (HV) rating class of the high EGDI group and are therefore on the cusp of transitioning to the very high EGDI group.

Moving up ten or more positions in the EGDI ranking typically represents significant e-government development; LLDCs that have achieved such progress in 2020 include Armenia, Bhutan, Paraguay, Kazakhstan and Botswana.

2.3.3 Small island developing States

Table 2.9 presents the SIDS with the highest EGDI values in 2020. SIDS are characterized by the highest variance in EGDI values, which range from 0.28 in Papua New Guinea to 0.91 in Singapore. The latter is one of the world leaders in e-government development and is part of the highest (VH) rating class in the very high EGDI group. Bahrain (in the V2 rating class) is the only country in this group other than Singapore with a very high EGDI value.

Table 2.9 Small island developing States with the highest EGDI values

Country	Rating class	EGDI Rank	Sub-Region	OSI value	HCI value	TII value	EGDI (2020)	EGDI (2018)
Singapore	VH	11	South-Eastern Asia	0.9647	0.8904	0.8899	0.9150	0.8812
Bahrain	V2	38	Western Asia	0.7882	0.8439	0.8319	0.8213	0.8116
Barbados	HV	62	Caribbean	0.5765	0.8549	0.7523	0.7279	0.7229
Mauritius	HV	63	Eastern Africa	0.7000	0.7911	0.6677	0.7196	0.6678
Bahamas	HV	73	Caribbean	0.6765	0.7546	0.6739	0.7017	0.6552
Seychelles	H3	76	Eastern Africa	0.6176	0.7660	0.6925	0.6920	0.6163
Trinidad and Tobago	H3	81	Caribbean	0.6118	0.7434	0.6803	0.6785	0.6440
Dominican Republic	H3	82	Caribbean	0.7647	0.7419	0.5279	0.6782	0.5726
Fiji	H3	90	Melanesia	0.5059	0.8227	0.6468	0.6585	0.5348
Saint Kitts and Nevis	H2	95	Caribbean	0.3941	0.8035	0.7080	0.6352	0.6554
Antigua and Barbuda	H2	98	Caribbean	0.4471	0.7518	0.6176	0.6055	0.5906
Dominica	H2	99	Caribbean	0.4471	0.6698	0.6871	0.6013	0.5794
Grenada	H2	102	Caribbean	0.3412	0.8576	0.5449	0.5812	0.5930
Maldives	H2	105	Southern Asia	0.4353	0.6886	0.5981	0.5740	0.5615
Tonga	H2	108	Polynesia	0.3765	0.8283	0.4800	0.5616	0.5237
Saint Vincent and the Grenadines	H2	109	Caribbean	0.4706	0.7214	0.4894	0.5605	0.5306
Cabo Verde*	H2	110	Western Africa	0.5000	0.6337	0.5476	0.5604	0.4980
Saint Lucia*	H1	112	Caribbean	0.3824	0.7205	0.5302	0.5444	0.4660
Jamaica*	H1	114	Caribbean	0.3882	0.7142	0.5151	0.5392	0.4697
Suriname*	H1	122	South America	0.2882	0.7098	0.5482	0.5154	0.4773
Palau	H1	125	Micronesia	0.2765	0.8816	0.3745	0.5109	0.5024

* Countries that have moved from the middle to the high EGDI group.

Source: 2020 United Nations E-Government Survey.

If Singapore and Bahrain are excluded from the analysis of e-government performance among SIDS, the results clearly reflect the capacity constraints experienced by these countries as a consequence of their small size, remoteness and dispersion (in the case of island archipelagos) and the impact

of those constraints on the quality of the public sector.[6] The 19 remaining countries featured in the table are all in the high EGDI group but have an average EGDI value (0.5716) that is below the global average (0.60). This points to persistent challenges that continue to undermine the efforts of SIDS to improve the telecommunications infrastructure, online services provision, and human capital development.

SIDS that have transitioned from the middle to the high EGDI group include Cabo Verde, Saint Lucia, Jamaica and Suriname. These countries, like many others in the same group, have highly developed human capital but are unable to realize their full potential owing to impediments to effective online services provision (reflected in OSI values below 0.40) and infrastructure-related limitations.

Box 2.7 Caribbean and Pacific small island developing States: similarities anddifferences

Most SIDS experience constraints in e-government development relating to their small size, remoteness and dispersion (in the case of island archipelagos). The SIDS in Oceania face additional constraints deriving from the lack of comprehensive, up-to-date legislative and institutional frameworks for ICT and digital adoption. The prevalence of strategic, policy, institutional and legal frameworks conducive to e-government development among SIDS in this region is relatively low; for instance, legislation on the right to information and/or the protection of personal data has been enacted in only 3 out of 12 SIDS in Oceania, compared with 9 out of 16 SIDS in the Americas. National e-government/digital readiness strategies and relevant legislation, when available, are limited in scope and rarely mention the use of new/emerging technologies in the public sector. At this point, the Solomon Islands has legislative regulations for open government data, the digital publishing of government expenditures, and digital certification/signature. Kiribati is formulating new legislation on personal data (to be enacted in 2020), and Tuvalu is currently preparing a new telecommunications act to promote e-government development.

The SIDS in Oceania generally do not engage in the systematic collection of data on digital literacy skills, the usage of online services, the way technologies are utilized, or the type of online services used by the public. When data are collected by public institutions (in Tonga, Vanuatu and Tuvalu, for example), the focus is mainly on indicators relating to access to computers/tablets in schools, homes and offices. The use of social media by government agencies tends to be more limited or restricted in the SIDS in Oceania than in the SIDS in the Americas. In the Solomon Islands and Vanuatu, for example, the use of social media outlets by government officials is restricted and must be approved, in part due to bandwidth connectivity issues in public institutions. By contrast, most public institutions in the Caribbean freely promote events, disseminate information and engage with citizens through social media outlets.

All but two SIDS in the Americas have national strategies on e-government/digital readiness in place, and these strategies often address the adoption of frontier technologies such as the Internet of Things, virtual reality, augmented reality, smart cities, big data and blockchain. In the strategies of the Dominican Republic and Trinidad and Tobago, attention is given to "once-only (data)" and "digital-first" principles in online services provision. Caribbean SIDS are more likely than SIDS in Oceania to have digital implementation plans that make specific reference to e-participation, digital inclusion and/or public engagement, and many SIDS in the Americas, including the Dominican Republic, Panama, and Trinidad and Tobago, allocate government resources (a certain percentage of gross domestic product) for the improvement of ICT infrastructure in the public sector. Internet and ICT use among public officials in some Caribbean SIDS (El Salvador and Saint Vincent and the Grenadines) is above 90 per cent.

Sources: Member States Questionnaires.

2.4 Summary and conclusion

All regions have improved their average EGDI values in 2020, contributing to an increase in the global EGDI average. Africa and Oceania have made the most rapid progress, having increased their regional EGDI values by 14 per cent each. Other important regional trends are summarized below.

Europe remains the world leader in e-government development and in the provision of online services, though all regions have made progress in these areas. After Europe, the regions with the highest EGDI values (in descending order) are Asia, the Americas, Oceania and Africa.

During the past four years, Africa has made significant progress in e-government development, with only 7 of the region's 54 countries remaining in the low EGDI group.

Notwithstanding the impressive advances made in Africa and in e-government development globally, the 2020 Survey findings confirm the persistence of digital divides within and between countries and regions.

In the Americas and Asia, more than 60 per cent of countries offer 16 of the 20 online transactional services assessed in the 2020 Survey.

At the regional level, the provision of online services to vulnerable populations follows a trend similar to that observed in 2018. Europe has the highest proportion of countries offering such services (93 per cent), followed by the Americas (84 per cent), Asia (80 per cent), Oceania (65 per cent), and Africa (55 per cent).

Endnotes

1 The range of EGDI group values for each level are mathematically defined as follows: very high EGDI values range from 0.75 to 1.00 inclusive, high EGDI group values range from 0.50 to 0.7499 inclusive, middle EGDI values range from 0.25 to 0.4999 inclusive, and low EGDI values range from 0.0 to 0.2499 inclusive. In all references to these ranges in text and graphic elements, the respective values are rounded for clarity and are expressed as follows: 0.75 to 1.00, 0.50 to 0.75, 0.25 to 0.50, and 0.00 to 0.25.

2 A quartile is a statistical term describing a division of data into four defined intervals. The quartile measures the spread of values above and below the mean by dividing the distribution of data into four groups. A quartile divides data into three points—a lower quartile, median, and upper quartile—to form four groups of the data set. In the 2020 United Nations E-Government Survey, the lower (or first) quartile in each EGDI group is denoted as L1, M1, H1 or V1 and is the middle number that falls between the smallest value of the data set and the median. The second quartile (L2, M2, H2 or V2) is also the median. The upper (or third) quartile, denoted as L3, M3, H3 or V3, is the central point that lies between the median and the highest number of the distribution. LM, MH, HV and VH are the highest data points in each EGDI group.

3 In statistics, the standard deviation is a common measure of dispersion. Standard deviation measures how spread out the values in a data set are around the mean. More precisely, it is a measure of the average distance between the values of the data in the set and the mean. If the data values are all similar, then the standard deviation is low (closer to zero). If the data values are highly variable, then the standard deviation is high (further from zero).

4 The box plot displayed in Figure 2.2-3 denotes the full range of variation (from min to max) of the values, the likely range of variation (represented by whiskers), and a typical value (the median). The dots outside of the range of whiskers display the outlies.

5 See the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (http://unohrlls.org/about-ldcs/).

6 Virginia Horscroft, "Public sectors in the Pacific Islands: Are they 'too big' and do they 'crowd out' the private sector?" Policy Research Working Paper No. WPS 7102 (Washington, D.C., World Bank, 2014), available at http://documents.worldbank.org/curated/en/986481468098052675/Public-sectors-in-the-pacific-islands-are-they-too-big-and-do-they-crowd-out-the-private-sector; and M. Mycoo and M.G. Donovan, "A blue urban agenda: adapting to climate change in the coastal cities of Caribbean and Pacific Small Island Developing States".

3. Regional Challenges and Opportunities

Photo credit: pixabay.com

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3.1 Introduction

Chapter 3 presents a qualitative assessment of regional progress, complementing the global and regional quantitative assessments of e-government development provided in chapters 1 and 2. It offers an empirical overview of regional challenges and opportunities and analyses regional responses through a review of relevant initiatives and cross-border partnerships. This chapter has benefited from the contributions of various United Nations regional commissions and from the discussions and outputs of an expert group meeting on the preparatory process for the United Nations E-Government Survey, held by the United Nations Department of Economic and Social Affairs (UN DESA) in New York on 1 and 2 April 2019.

3.2 Regional development

3.2.1 Africa

Digitalization is expanding rapidly in Africa. African countries, their regional organizations, and the African Union are putting in place national and regional policies, strategies and regulations aimed at ensuring that the continent's residents can take full advantage of the possibilities offered by digitalization and digital transformation. These measures are aligned with the policy goals set out in the African Union's Agenda 2063 and with the objectives of the 2030 Agenda for Sustainable Development, including the Sustainable Development Goals (SDGs) and associated targets.[1]

Digitalization offers new opportunities to improve public administration and boost the economy. A number of African countries have stepped up their efforts to integrate digital technologies in government processes, and many are now offering various e-services with the objective of improving government efficiency, transparency, responsiveness, effectiveness, and service delivery. Digital technologies are also being adopted to support government efforts to build and protect the economy; in some areas, for example, these technologies are being used to facilitate direct tax collection, support enterprise creation and development, and reduce illicit financial flows into and out of the region.

Regional challenges and opportunities

The challenges associated with the delivery of effective e-government in Africa remain complex. Information and communications technology (ICT) infrastructure is undeveloped or underdeveloped in large parts of the region, with many countries lacking the necessary resources and/or mechanisms to fully address priorities in areas such as cybersecurity,

the protection of privacy, the power supply (electrification), Internet access and connectivity, interoperability and collaboration systems, and data infrastructures.

Despite more than three decades of ICT development, Africa still lags behind other regions in ICT infrastructure, access, use and skills. Internet penetration in Africa is estimated at 36 per cent (473 million people online).[2] These deficits are likely to affect the further development of e-government in Africa as the pace of technological innovation accelerates, posing serious challenges to the process of digital transformation in Africa.

The competing development priorities in most African countries and the low level of domestic resource mobilization have also led to serious financial constraints. The immediate need to increase digital equity and reduce inequalities has imposed a higher demand on existing infrastructure and related expenditures. However, the challenges for Africa in digital transformation go beyond infrastructure and finance, extending to leadership, legal and regulatory frameworks, institutional frameworks, and human and institutional capacities. Illiteracy (including e-illiteracy), language barriers, and Internet accessibility and affordability (especially for vulnerable groups) are only a few of the relevant socioeconomic issues that require urgent attention if digitalization is to move forward.

Comprehensive national digital transformation strategies and implementation plans that integrate national priorities with regional and global priorities are the way forward. A considerable number of African countries have already introduced changes that are contributing to digital transformation at the national and regional levels. For example, Mauritius is setting up a regional e-governance academy, Nigeria has launched the Government Integrated Financial Management Information System (GIFMIS), Zimbabwe has activated a public-sector financial management system, cash registers in Ethiopia are directly connected to the tax authority, and Namibia has set up a user experience platform (UXP) that allows digital manifestations of various State institutions to be integrated into a single system. About half of the countries in Africa have digital identification (ID) card systems designed to facilitate digital, financial and social inclusion.[3]

Comprehensive digital identity systems are the gateway to effective digital trade and the development of the digital economy, which are high priorities for the region in its bid to achieve growth-driven digital transformation. However, recent progress notwithstanding, more than 500 million people in Africa still have no legal identity.[4] By providing legal identities, Governments in Africa hope to unleash a new wave of innovation, expand financial inclusion and prevent fraud, while also increasing efficiency, transparency and accountability in the delivery of social services. With the establishment of the African Continental Free Trade Area (AfCFTA)[5] in 2018, the timely implementation of robust systems integrating digital identity technology is imperative.

New technologies are helping Governments improve e-services delivery and adapt to evolving needs, but their full potential has not yet been exploited in Africa. The possibilities deriving from the increased uptake of frontier technologies[6] such as the Internet of Things (IoT), big data and blockchain are virtually limitless; in Africa, such technologies can be employed to address needs in multiple areas, including agriculture, health care, education and social protection.

Regional partnerships and initiatives

Tackling the challenges associated with digitalization and unleashing its potential to improve governance and growth in Africa require coordinated and integrated approaches at the national and regional levels. There are many regional initiatives and partnerships that have been established to advance digital transformation in the region; one worth highlighting is the Smart Africa initiative. Recognizing the need for coordination and collaboration, 30 African countries came together in 2013

and, in partnership with international and regional organizations and the private sector, affirmed their commitment to innovative digital transformation in Africa. Since then, Smart Africa has been leading regional digitalization efforts with the highest levels of political support (see box 3.1).

Box 3.1 Smart Africa

The Smart Africa initiative, established in 2013 during the Transform Africa Summit in Rwanda, aims to transform Africa into a knowledge society with wide and affordable access to broadband and ICT infrastructure and services.

The initiative is guided by the Smart Africa Manifesto, which was endorsed by all African leaders at the 22nd Ordinary Session of the Assembly of Heads of State and Government of the African Union, held in Addis Ababa in January 2014. The principles of the Manifesto include putting ICT at the centre of national socioeconomic development; improving access to ICT; improving accountability, efficiency and openness through ICT; strengthening the private sector; and more generally leveraging ICT to promote sustainable development.

Sources: Smartafrica.org; the Manifesto is available at http://smartafrica.org/new/wp-content/uploads/2019/01/smart_africa_manifesto_2013_-_english_version.pdf.

There has also been a renewed commitment from regional and international partners to work towards the regional harmonization of legal and regulatory frameworks to accelerate digital transformation in Africa. Instruments adopted in support of this objective include the African Charter on Values and Principles of Public Service and Administration; the African Charter on Democracy, Elections and Governance; and the African Union Convention on Cyber Security and Personal Data Protection. The Policy and Regulation Initiative for Digital Africa (PRIDA)[7] was launched in 2019 to address broadband supply and demand and to build the capacities of African stakeholders in the Internet governance space, thereby enabling the African continent to reap the benefits of digitalization (see box 3.2).

Box 3.2 Policy and Regulation Initiative for Digital Africa

The Policy and Regulation Initiative for Digital Africa (PRIDA), a joint programme of the African Union, European Union and International Telecommunication Union, aims to lay the foundation for and thus facilitate the provision of "universally accessible, affordable and effective wireless broadband across the continent to unlock future benefits of Internet-based services".a The three pillars of the Initiative (on which relevant activities are based) include efficient and harmonized spectrum utilization; the harmonization of measurable ICT/telecommunications policy, legal and regulatory frameworks; and the active participation of African decision makers in the global Internet governance debate.b

PRIDA is to be carried out over three years within the period 2018-2022. The ultimate goal is to engage in targeted activities that will result in bringing an additional 300 million people online by 2025.

Sources: (a) International Telecommunication Union, PRIDA-ITU Delegation Agreement for Action, available at https://www.itu.int/net4/ITU-D/CDS/projects/display.asp?ProjectNo=9RAF18089; (b) European Commission, Pan African Programme, "Policy and Regulation Initiative for Digital Africa (PRIDA)", factsheet, available at https://www.africa-eu-partnership.org/en/projects/policy-and-regulation-initiative-digital-africa-prida.

SDG target 16.9 calls for providing legal identity for all, including birth registration, by 2030. In a broad sense, establishing legal identity for all contributes to the Goal 16 objectives of promoting peaceful and inclusive societies for sustainable development, providing access to justice for all, and building effective, accountable and inclusive institutions at all levels. Within the context of building strong institutions, the use of digital identification, or digital ID, creates an opportunity to broaden

the tax base by improving taxpayer identification and tracking and helps taxpayers meet their tax obligations through the use of mobile technology. It also enhances government capacities to mobilize additional resources through better tax assessment and administration.

Various initiatives have been undertaken to move digital identification efforts forward. At the 32nd Ordinary Session of the Assembly of Heads of State and Government of the African Union, held in Addis Ababa in February 2019, the United Nations Economic Commission for Africa (ECA) agreed to collaborate with the African Union Commission, Smart Africa, and others on the development of a digital ID and digital economy strategy. In response to the growing need for regional cooperation, the ECA Centre of Excellence for Digital Identity, Trade and Economy[8] was established in 2018 to provide technical support and capacity-building assistance to countries requesting help with challenges linked to, among other things, digital ID and the digital economy, broadband expansion, e-government, and taxation systems. The Centre plays a research, advisory and coordination role. Its work is anchored in promoting the harmonization of standards, regulations, infrastructure and capacity development on the African continent for the development of digital identity and the digital economy. The Ten Framework Principles for Good Digital ID and the Digital Economy have been developed by the Centre with a view to supporting the harmonization and interoperability efforts of African States.

3.2.2 Asia and Oceania

The expansion of digitalization in Asia continues to transform the lives of billions of people in the region. Digital initiatives undertaken by Governments and public institutions have offered opportunities to promote more inclusive growth, increase access to key services in sectors such as health and education, improve the overall quality and coverage of public services, and enhance digital transformation and e-government development at the national and regional levels.

Regional challenges and opportunities

Asia is the world's most populous—and most digitally divided—region in the world. Asian countries have widely diverse political, cultural, economic and social contexts and are characterized by different levels of economic and social development. Some countries in the region are actively engaged in the development and application of frontier technologies such as artificial intelligence (AI), IoT and robotics and are already front-runners in technology development, usage and innovation; however, large numbers of countries in the region are on the other side of the digital divide, and until well-developed ICT infrastructure, sufficient human capital, and adequate resources are in place to mobilize large-scale digitalization efforts, it is unlikely that these countries will be able to transform technological innovation into sustainable development dividends.

The connectivity gap. Accessible, affordable and reliable connectivity, especially to broadband Internet, plays a crucial role in enabling digital transformation. While broadband penetration has increased in the region, there is a widening gap among countries.[9] The Republic of Korea and Japan rank among the top ten in the world in fixed broadband penetration, but a number of countries, including Afghanistan, Lao People's Democratic Republic, Lebanon, Myanmar, Pakistan, Tajikistan, Timor-Leste and Turkmenistan, are among the least connected in the world, with fixed broadband penetration rates below 1 per cent. Similarly, 99.8 per cent of young people in the Republic of Korea have been active on the Internet for at least five years, while in Pakistan, the corresponding proportion is less than 20 per cent.[10] The gender digital divide is another concern in the region, as women and girls in many countries have less access than men and boys to broadband Internet and knowledge-enhancing applications and services.[11]

The digital skills gap. E-government mainly benefits people who are literate. ICT and e-government applications are most effective when public sector entities and users have appropriate digital skills. A report released by the International Telecommunication Union (ITU) in 2018[12] identifies the level of educational attainment as one of the strongest indicators of digital skill proficiency; countries that have a larger segment of the population with higher education also tend to have higher digital skill levels.

Education access and quality remain a challenge in Asia, though relevant indicators vary considerably among countries. In the World Bank's 2018 Human Capital Index,[13] Singapore, Japan and the Republic of Korea are some of the highest-ranked countries among the 157 economies assessed, while Afghanistan, Pakistan and Yemen (respectively ranked 132rd, 134th and 146th) are at the lower end of the scale in terms of human capital development. Education spending is generally considered productive expenditure, but there are wide gaps in government spending on education among the region's countries; this is significant because education plays an important, multifaceted role in helping countries navigate digital transformation. Expenditure on education remains particularly low in a number of developing countries in Asia, including Timor-Leste and Cambodia, where education accounts for less than 10 per cent of total government expenditure. Low levels of human capital development and public spending on education may effectively undermine e-government development, as generic skills and education tend to be positively correlated with successful e-government implementation.

Gaps in the legal and policy framework. Regulatory and policy priorities for digital transformation have been mixed across countries in Asia. Some countries have been proactive in developing strategies across the full range of government policies and legal frameworks to leverage the benefits of digital transformation and e-government applications. The legal frameworks[14] for electronic transactions, data protection/information privacy and cybercrime prevention generally shape present and future digital transformation efforts in Asia. Out of 47 selected Asian countries, 87 per cent have enacted e-transaction laws and 79 per cent have legislation to combat cybercrime, but only 57 per cent have privacy laws and fewer than half have adopted consumer protection laws.

Despite the challenges, the countries in the region are making progress towards digital transformation. In Indonesia and the Philippines, digital social registry systems[15] serve as gateways for social protection programmes, with cash transfers and emergency assistance delivered straight to the intended households in need. Digital registry systems such as these allow more transparency and credibility in the design and delivery of social protection programmes. Bhutan has introduced a point/score-based online evaluation tool (e-tool)[16] that helps expedite the Government's procurement processes, standardize project appraisals, and promote efficient and transparent selection of public investment projects. The tax authority in Viet Nam has implemented e-filing, e-payment and e-customs initiatives that have helped to improve tax collection and management and have lowered taxpayers' compliance costs. In Afghanistan, with efforts under way to promote increased reliance on cashless financial transactions, the Government has partnered with mobile operator Roshan to establish mobile money services through which funds can be quickly transferred over the operator's network to rural parts of the country.

ICT is also being used to deliver public services to residents in several Pacific Island countries. Governments have set up online business registries in Tonga,[17] Samoa[18] and Vanuatu,[19] online taxation services in Fiji and the Solomon Islands,[20] an online passport application system in Papua New Guinea,[21] online references to legislation in Tuvalu,[22] and online birth and death registration throughout the Pacific subregions.[23]

Notwithstanding the progress made, many countries in the Pacific still face challenges in the adoption of digital technologies, especially in government and public administration. These countries are widely separated by the vastness of the Pacific Ocean, which makes infrastructure development and the provision of broadband access a relatively complex and often expensive undertaking—and this affects the development and adoption of e-government applications and services. Excluding Australia and New Zealand, only about 50,000 individuals (0.4 per cent of 10.9 million people) were connected to fixed broadband services in 2017, and nine countries in the region still have fixed broadband penetration rates below 2 per cent.[24]

The affordability of broadband access is an issue for many living in the Pacific Islands. In Kiribati, the Marshall Islands, the Federated States of Micronesia, Papua New Guinea, the Solomon Islands, Tuvalu and Vanuatu, for example, the cost of access to mobile broadband is equivalent to more than 5 per cent of gross national income per capita.[25]

Small island developing States (SIDS) are prone to natural disasters, making their ICT infrastructure highly vulnerable to damage and disruption. Between 2000 and 2019, the Pacific region—where most SIDS are located—experienced more than 200 natural disasters that caused thousands of fatalities, affected millions of people, and resulted in losses exceeding several billions of United States dollars. While access to broadband connectivity has improved with the installation of submarine fibre-optic cables connecting most island countries (and a cable connecting Samoa, French Polynesia, the Cook Islands and Niue is expected to be completed in May 2020),[26] disaster risk has not been adequately addressed. In such a disaster-prone region, deploying smart sensors or devices on submarine telecommunications cables can serve not only to help monitor and assess disaster risks but also to mitigate the impact of natural disasters on infrastructure or prevent damage altogether.

Many Pacific Island countries still lack adequate, up-to-date legislation and regulations for ICT and digitalization. However, the SIDS in the region have begun to pursue regulatory reforms that support national and regional efforts to mobilize and manage technological changes, improve economic standards and provide affordable ICT services.[27] Some countries, such as Fiji, Papua New Guinea, Samoa, the Solomon Islands, Tonga and Vanuatu, have introduced measures and policies aimed at encouraging greater competition in the sector; other countries are still in the process of establishing new sectoral policies and reforms for this purpose.[28]

Regional initiatives and partnerships

Countries continually review and revise their development priorities to best address the needs of society, and embracing e-government development and digital transformation is increasingly perceived as a key facilitator and driver of sustainable development. In 2009, Bangladesh adopted the national Digital Bangladesh strategy,[29] which aims to transform the country into a digitally developed nation by 2021 through ICT integration in support of good governance, law enforcement, employment and growth. In 2015, the Government of India launched the Digital India[30] programme with the objective of bridging the gap between urban and rural areas by promoting investment in digital infrastructure, fostering digital literacy, and expanding online services provision. In 2012, Digital Malaysia[31] was officially unveiled as the nation's transformational programme, designed to drive the country's transition towards a developed digital economy. Initiated by the Government for implementation during the period 2018-2022, Digital Kazakhstan[32] aims to accelerate the country's economic development, improve the quality of life of the population, and create the necessary conditions for the transition to a digital economy.

The Governments of many Pacific Island countries, having faced challenges in public services delivery owing to the scattered nature of the population, recognize the importance of ICT applications in

improving public sector accessibility and have adopted national policies to promote e-government development.

According to a study published by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) on broadband connectivity in Pacific Island countries,[33] at least 10 of the 14 countries in the Pacific region have national ICT policies in place, with some of them clearly identifying the development of e-government services as a key policy goal and an important component of national development plans and strategies.

At the regional level, ESCAP launched the Asia-Pacific Information Superhighway (AP-IS) initiative as a complement to national initiatives (see box 3.3).[34] This initiative promotes the development of seamless regional broadband networks that will improve the affordability, reliability, resilience and coverage of broadband Internet and thus address the digital divide within and between countries in Asia and the Pacific. Through this initiative, ESCAP is also promoting the Belt and Road Initiative among countries in the region (see box 3.4).

Box 3.3 Asia-Pacific Information Superhighway

The goal of the Asia-Pacific Information Superhighway (AP-IS) initiative is "to improve regional broadband connectivity through a dense web of open access cross-border infrastructure that will be integrated into a cohesive land- and sea-based fibre network with the ultimate aims of increasing international bandwidth for developing countries in the region, lowering broadband Internet prices and bridging the digital divide in the region" (E/ESCAP/CICTSTI(1)/2, para. 1).

The Master Plan for the Asia-Pacific Information Superhighway and the Asia-Pacific Information Superhighway Regional Cooperation Framework Document outline a long-term vision, goals, activities and milestones deriving from the following four pillars (ibid., paras. 24-27):

- *Connectivity*: "enhancing seamless regional broadband fibre-optic backbone connectivity";
- *Traffic and network management*: "enhancing Internet traffic exchange and management systems and harmonizing related policies in a more efficient and effective manner, domestically as well as at the subregional and regional levels, which will lead to better quality of [broadband] service";
- *E-resilience*: strengthening "the resilience of existing/planned ICT infrastructure through methods such as enhanced network diversity, while recognizing the importance of resilient infrastructure to sustainable development and the critical role played by ICT in disaster risk reduction and management";
- *Broadband for all*: supporting "an environment that will lead to the promotion of inclusive access for all, acknowledging the special needs and challenges faced by least developed and landlocked developing countries".

In acknowledgement of the wide geographical dispersion and different development priorities among countries, the ESCAP AP-IS initiative includes provisions for both intraregional and subregional cooperation.

Sources: ESCAP, "Asia-Pacific Information Superhighway" (Bangkok), available at https://www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway/about; ESCAP, "Master Plan for the Asia-Pacific Information Superhighway", note by the secretariat, E/ESCAP/CICTSTI(1)/2 (5 September 2016), available at https://www.unescap.org/sites/default/files/Master_Plan_for_APIS_English_0.pdf; and ESCAP, "Asia-Pacific Information Superhighway Regional Cooperation Framework Document", note by the secretariat, E/ESCAP/CICTSTI(1)/3 (5 September 2016), available at https://undocs.org/E/ESCAP/CICTSTI(1)/3

Another regional initiative supported by United Nations entities is the Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway, which promotes the "the sustainable development of small island developing States through genuine and durable partnerships"[35]

Box 3.4 Digital Silk Road

The Digital Silk Road is an important component of the Belt and Road Initiative (BRI), which was introduced by China in 2013 to enhance connectivity and collaboration among nearly 70 countries in Asia, Africa and Europe. Thus far, China has signed cooperation agreements with 16 countries for the construction of the Digital Silk Road. The most recent version of the implementation mechanism is the Action Plan on Belt and Road Standard Connectivity (2018-2020). The Digital Silk Road initiative has expanded in scope from its early focus on fibre-optic cable installation to include elements such as smart city projects, cloud computing and big data.

Through the Asia-Pacific Information Superhighway (AP-IS) initiative, ESCAP is collaborating with the Government of China to promote the Belt and Road Initiative among member States along the BRI corridors and within the wider Asia-Pacific region. ESCAP-China cooperation could increase inclusiveness and buy-in among the 62 ESCAP members and associate members and strengthen support for the BRI. ESCAP-China cooperation will also allow stakeholders to benefit from the synergies between the AP-IS initiative and the BRI, which include stronger relations between ESCAP member countries and coordinated progress towards sustainable development. ICT connectivity is critical to the achievement of these objectives, as it provides the foundation for communication, information sharing, data exchange, broader infrastructure development, trade and transport flows, and socioeconomic collaboration between the people, organizations and countries along the BRI corridors.

Sources: ESCAP, "A study of ICT connectivity for the Belt and Road Initiative (BRI): enhancing the collaboration in China-Central Asia Corridor", working paper by the Information and Communications Technology and Disaster Risk Reduction Division (Bangkok), available at https://www.unescap.org/sites/default/files/BRI.pdf.

Box 3.5 SAMOA Pathway

The Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway—a regional initiative adopted at the Third International Conference on Small Island Developing States in September 2014 and endorsed by the General Assembly of the United Nations in resolution 69/15 of 14 November 2014—officially recognizes the need for concrete measures to advance the sustainable development of SIDS and move the international sustainable development agenda forward. The action-oriented programmes undertaken within this framework are to be implemented through genuine and durable partnerships across a wide variety of stakeholders.

The SAMOA Pathway initiative addresses a broad range of development needs and priorities. It is acknowledged that access to appropriate modern technologies and the establishment of a reliable, affordable and secure ICT infrastructure play a critical role in achieving sustainable development. With a strong digital foundation in place, SIDS will have the capacity to develop effective e-government systems and mechanisms that will strengthen public administration and accelerate progress towards meeting the Sustainable Development Goals and related targets.

The ICT4SIDS Partnership was set up to facilitate the rapid implementation of activities contributing to the achievement of the SDGs, and it is expected that this mechanism will significantly accelerate progress towards the SAMOA Pathway goals. ICT4SIDS offers two important decision support tools; the SDG Advisor helps SIDS assess their status and launch the necessary services, and the powerful Computer-Aided Planner allows the rapid implementation of more than 150 services in support of 12 SDGs. A third key feature is the initiative's implementation methodology, which involves the establishment of highly specialized smart hubs around the world that have the capacity to address location-specific needs and factor in limitations. The creation of location-specific "pilot" hubs incorporates the first two (advisory and planning) features, supported by training and capacity-building and, in the final stage, the launch and hand-off of the portal(s) produced.

Sources: United Nations, General Assembly, "SIDS Accelerated Modalities of Action (SAMOA) Pathway", resolution 69/15 of 14 November 2014 (A/RES/69/15, 15 December 2014), available at https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/69/15&Lang=E.

(see box 3.5). This unique intergovernmental partnership focuses on wide-ranging development priorities, one of which is strengthening ICT infrastructure to promote development[36] and increased government efficiency, transparency and accountability. As part of this initiative, it is envisioned that national Governments will support and facilitate the expansion of ICT infrastructure through the provision of targeted training and through the promotion of good governance deriving from the establishment and management of effective, transparent and accountable institutions.

3.2.3 Europe and Central Asia[37]

The 2030 Agenda has guided the United Nations Economic Commission for Europe (ECE) in its efforts to advance regional economic integration and ensure that no one is left behind. ECE members include countries in both Europe and Central Asia. There is considerable political, cultural, social and economic diversity among the member countries, and levels of development—including digital development—vary widely. The region includes a large group of developed economies but is also home to a number of economies in transition; e-government has a key role to play in all of these countries. Some Governments in the ECE region are at a relatively advanced stage, using technologies such as ICT, big data, AI and machine learning to improve public services, empower people, and ultimately provide a better quality of life. Others are in the nascent stages of e-government (and broader digital) development.

The European Union is playing a key role in advancing digitalization both within and outside the region. The European Commission's European strategy for data[38] and white paper on artificial intelligence,[39] along with similar regional blueprints, are helping to lay solid foundations for the development of digital societies. The countries in the European Union have built "smarter" cities and have achieved high levels of e-government development through improved digital access in multiple sectors; these countries are moving rapidly towards a truly digital European society.[40] Efforts are being made to develop cross-border digital public services through the establishment of a digital framework offering tools and systems for improved service delivery to people and businesses.[41]

The Digital Europe programme for the period 2021-2027[42] is the "first ever funding programme dedicated solely to supporting digital transformation" in the European Union.[43] The programme aims to strengthen investment in "supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of these digital technologies across the economy and society".[44] The objective is to enhance the competitiveness of the region in the global digital economy and improve people's lives. Policies being formulated by the European Commission to support the Digital Europe programme will focus on digital skills training to prepare society for the digital transformation.

Recognizing the importance of digital regulation in shaping the digital future of Europe in this era of rapid technological change, the European Parliament is generating a policy framework "that will help citizens and businesses fully exploit the potential of digital technologies".[45] The aim is to create policies that support the adoption of new and emerging technologies, regulate the digital transformation in industry, and strengthen trust. One important goal is to achieve vertical and horizontal policy coordination through the harmonization of digital policies and legislation for telecommunications, e-commerce, consumer protection, and other relevant priority areas in the region. The European Union is also encouraging the coordination of non-legislative initiatives and activities, including the development of e-government and e-skills, though any movement in this direction remains at the discretion of individual Governments.

The Digital4Development (D4D) initiative,[46] established in 2017, focuses on accelerating digital transformation within and beyond the region's borders through the mainstreaming of digital technologies and services into development policy in the European Union and in partner countries

(with African nations identified as a priority in this context). The initiative's four mainstreaming priorities are to "(i) promote access to affordable and secure broadband connectivity and to digital infrastructure, including the necessary regulatory reforms; (ii) promote digital literacy and skills; (iii) foster digital entrepreneurship and job creation; and (iv) promote the use of digital technologies as an enabler for sustainable development".[47]

Regional challenges and opportunities

Regional economic integration has been at the forefront of policymaking among ECE member States. ICT strengthens trade connectivity and thereby facilitates regional integration. The developed economies in Europe are generally advanced in the digital provision of services in both the public and private sectors, but a number of countries in Europe and Central Asia have not reached this level. The discrepancies extend to all sectoral areas of e-government at the national and subnational levels.

Trade facilitation is one area in which the divergence in progress is apparent. The European Union is the largest economic bloc in the region and benefits from a customs union, and trade regulatory systems are designed for seamless electronic communication between trading stakeholders and government entities within the European Union. Heightened challenges on this front are faced by countries that are not part of the bloc (except Switzerland and Norway).

The *Global Survey on Digital and Sustainable Trade Facilitation* identifies a set of trade-related services that can be provided in digitized (paperless) form to facilitate trade and analyses the extent of implementation for each measure. According to the 2019 edition of the Global Survey, the European Union countries, Switzerland and Norway have collectively achieved an average implementation rate of 77 per cent for paperless trade measures.[48] By contrast, the corresponding rate for South-eastern European countries as a group is 47.5 per cent—well below the average of 71.7 per cent for the ECE region as a whole.[49]

Digital connectivity and the interoperability of regulatory systems have far-reaching implications for the regional integration of landlocked developing countries (LLDCs). Greater implementation of digital cross-border measures can help improve the competitiveness of these countries in global markets. The LLDCs in the ECE region have made some progress in this area, but there is still work to be done to ensure that the necessary mechanisms are in place for optimized integration.

A review of the situation in the LLDCs confirms that a gap remains between the implementation of digital services and the availability of provisions for the facilitation of cross-border paperless trade. Digital customs systems have been fully or partially implemented in all of the region's LLDCs and include mechanisms for the electronic submission of customs declarations and supporting documentation. In Kazakhstan, for example, all customs declarations have been processed electronically since 2018, and Internet connectivity for customs offices and other border agencies is strong and well supported. However, in spite of the recent progress, laws and regulations governing electronic transactions in the region's LLDCs remain weak, and the same can be said of their institutional capacity for certifying electronic documents and their ability to exchange electronic customs declarations. This gap is perhaps not surprising, since it is not uncommon within the larger global context.

Regional initiatives and partnerships

The United Nations Special Programme for the Economies of Central Asia (SPECA), implemented jointly by ECE and ESCAP, continues to serve as the major framework for ECE cooperation with other relevant stakeholders in Central Asia and the provision of support to the SPECA member countries[50] in the implementation of the 2030 Agenda.

Regional partnerships and cross-border initiatives are bolstered by international standards, policy recommendations and guidelines that can support national digital systems as well as the cross-border exchange of electronic data. The World Trade Organization (WTO) Agreement on Trade Facilitation[51] duly promotes the use of international standards and the sharing of best practices to simplify import and export procedures (article 10, section 3), including the establishment of a single window or entry point for the submission of documentation and/or data requirements (article 10, section 4).

The work of the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT)—an intergovernmental body of ECE—offers a noteworthy example of how digitalization and technology uptake can have a positive, lasting impact on development (see box 3.6). Developed by UN/CEFACT in 1973, the United Nations Layout Key for Trade Documents is the basis for virtually every international trade document in the world. The derivative United Nations Electronic Data Interchange for Administration, Commerce and Transport (UN/EDIFACT) standard for electronic data exchange is widely used in international supply chains, transport and logistics; shipping companies and port terminals exchange more than 1 billion UN/EDIFACT messages per year, covering more than 75 per cent of sea freight worldwide.

Box 3.6 United Nations Centre for Trade Facilitation and Electronic Business

The United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) was created to improve worldwide coordination and cooperation in the exchange of trade products, services and information among business, trade and administrative organizations. Specifically, the Centre is tasked with facilitating national and international transactions through the simplification and harmonization of cross-border trade procedures and information flows. For several decades, UN/CEFACT has been developing facilitation methods and mechanisms—often through the use of digital technologies.

UN/CEFACT coordinates its activities with other international organizations, including the World Trade Organization, World Customs Organization, Organization for Economic Cooperation and Development, United Nations Commission on International Trade Law, and United Nations Conference on Trade and Development. To ensure coherence in the development of e-business standards, UN/CEFACT cooperates with the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), and selected non-governmental organizations (NGOs) in the context of the IEC/ISO/ITU/ECE Memorandum of Understanding. These relationships were established in recognition of the fact that the interoperability of systems and applications is essential for the simplification and harmonization of trade processes.

Sources: ECE, "Introduction: mission statement" [for the United Nations Centre for Trade Facilitation and Electronic Business], available at https://www.unece.org/cefact/about.html; ECE, "Memorandum of Understanding between the International Electrotechnical Commission, the International Organization for Standardization, the International Telecommunication Union and the United Nations Economic Commission for Europe", available at https://www.unece.org/fileadmin/DAM/oes/MOU/2000/24March2000_IEC_ISO_ITU.pdf.

3.2.4 Western Asia[52]

The power of digital technology to drive innovative and agile sustainable development is recognized by most countries in Western Asia. Priorities for improving service delivery in the region include enhancing citizen participation, fostering innovation within government structures and institutions, opening government data, and digitalizing institutions. These priorities are being addressed throughout the region; however, the adoption and application of new technologies and related standards varies considerably among countries, with effective deployment in some areas hampered by challenges relating to the digitalization process itself and/or to broader environmental factors such as low levels of socioeconomic development, political instability, or ongoing war and violence.

Regional challenges and opportunities

There are a number of common trends that have emerged within the region as it moves forward with digital transformation in pursuit of sustainable development. However, digital transformation priorities within the region are informed by diverse national needs and capacities and therefore vary widely from one country to another. As noted above, the digital transformation process can be affected by numerous factors, including digital capacity and access, governance, and societal circumstances or conditions. In each of the region's countries, these and other relevant factors guide government decisions on ICT integration and digitalization, including e-government development.

The current approaches to e-government development in the region are largely informed by the socioeconomic status of individual countries, though other factors may also come into play. Countries in conflict or post-conflict situations, such as Iraq, Libya and Yemen, are focusing mainly on enhancing access to ICT infrastructure and basic government services. Countries with moderate levels of development, such as Egypt, Jordan and Lebanon, are improving and expanding their digital offerings to ensure the effective delivery of high-quality inclusive government services. Higher-income countries such as Bahrain, Qatar and the United Arab Emirates are mobilizing the potential of emerging technologies to provide advanced government services and ensure a high level of user satisfaction.

Many countries have formulated and adopted national digital transformation plans (or are in the process of doing so) and are ensuring that such plans are aligned with—and in some cases incorporated in—national development plans. The Bahrain Economic Vision 2030[53] integrates provisions for digital development, and the Saudi Vision 2030,[54] Oman 2040,[55] and Kuwait 2035[56] strategies also include several initiatives related to digital government transformation. The Smart Qatar[57] initiative was launched in 2017, with plans for implementation by 2020. In the United Arab Emirates, several strategies related to digital government transformation have been developed, including Smart Dubai 2021.[58] In Egypt, the ICT 2030 Strategy[59] includes provisions for the digital transformation of government services. Morocco has adopted a national plan known as Digital Morocco 2020,[60] which is expected to be updated within the next year.

Although digitalization is a priority across the region, some countries are facing challenges that have undermined progress on this front. Conflict and civil strife have caused major disruptions in many parts of the Arab region, and the millions of people who have been displaced find it extremely difficult or even impossible to access services, including e-government services, in their home or host countries.[61] It should be emphasized that the deployment of e-government services in the early phases of recovery and reconstruction has the potential to provide internally displaced persons and refugees with access to essential information and services.

In least developed countries (LDCs) such as Mauritania, Sudan and Yemen, there has been an increase in mobile penetration rates, but most people do not have access to the Internet.[62] In the LDCs and some middle-income countries in the region, poverty prevents large numbers of people from enjoying the benefits of e-government, as many do not have the means to pay for the electronic devices or ICT services needed to access online public services. In some countries, public facilities are available where anyone can access the Internet, but the scale of deployment remains limited.[63]

Harnessing the potential of evolving digital technologies—in particular disruptive frontier technologies—can greatly improve e-government delivery systems and service delivery. These technologies have a number of applications in automation and are often used to simplify and optimize processes and to increase speed, efficiency and accuracy. In the present context, such technologies can be used for the creation of applications and software that increase transparency,

reduce corruption, streamline e-procurement, and improve overall governance while minimizing the potential risks.[64]

The adoption of emerging and frontier technologies has generated new opportunities for a number of countries in the region. Since 2016, some of the member countries of the Cooperation Council for the Arab States of the Gulf have explored the use of new technologies such as blockchain and AI for the delivery of government, financial and commercial services. Recently, the United Arab Emirates developed the UAE Strategy for Artificial Intelligence[65] and Emirates Blockchain Strategy 2021.[66] The objective of the blockchain strategy is to transfer 50 per cent of government transactions to blockchain by 2021, while the AI strategy focuses on improving government activities in specific sectors, including technology, transport, health, education, water, renewable energy and environment. Saudi Arabia has an agreement with IBM to implement blockchain applications for government and commercial services. In 2018, Bahrain implemented Legislative Decree No. 54/2018 for the Issuance of Letters and Electronic Transactions, which provides a legal framework for the use of new technologies such as blockchain for government services.[67]

Most of the regional activity surrounding the adoption of cutting-edge technology applications is concentrated in higher-income countries. Little has been done on this front in conflict-affected countries such as Yemen, the Syrian Arab Republic and Lebanon. However, a number of United Nations entities are utilizing emerging technologies to address some of the more urgent needs in the region; for example, blockchain is being used in the distribution of humanitarian assistance,[68] and new technologies for online education[69] are helping to build the needed skills in refugee camps in Jordan.

Initiatives and cross-border partnerships

Regional initiatives and strategic partnerships have been developed to address many of the common challenges faced by Arab countries. Representatives of the Economic and Social Commission for Western Asia (ESCWA) member countries and the ESCWA team are working together to facilitate digital transformation in the region through efforts such as establishing regional strategies that reflect a common vision, creating platforms for e-leaders, and developing regional measurement criteria for assessing progress in e-government development.

ESCWA, through its technical cooperation programme, is helping some countries in the region with the formulation of digital development plans. In Jordan, a plan for the digital transformation of government services was developed in 2019. The State of Palestine and the Syrian Arab Republic are also preparing their national digital transformation plans with assistance from ESCWA.

Some regional initiatives have been adopted in the Arab world in support of digital development priorities. However, these initiatives remain few in number and are mostly driven by regional entities such as the League of Arab States and ESCWA and by international organizations.

One of the first regional strategies was the Arab Strategy for Scientific and Technical Research and Innovation, adopted at the 14th Congress of Ministers of Higher Education and Scientific Research in the Arab World in March 2014 and endorsed by the League of Arab States in March 2017. The Strategy acknowledges the importance of concerted efforts to develop science and technology in ways that are aligned with regional development priorities. A particular focus of the Strategy is improving science education in universities through enhanced scientific research capacity and increased funding for research and development in order to close the gap between Arab and international research institutes and reduce Arab "brain drain".

The Arab Digital Development Report (ADDR) process was launched by ESCWA to guide the efforts of member countries in the production of national ADDRs. The ADDR assessment framework is based on an approach that essentially involves clustering the World Summit on the Information Society (WSIS) action lines with the 17 SDGs; this provides an integrated methodology for reviewing the development and application of digital technologies in the Arab region while also identifying digital technology gaps and areas for further development. In 2019, 10 countries participated in the process, providing national digital development reports that were then used to produce a regional report on digital development. The ADDR format includes digital government transformation under Cluster 4 of the ICT Regulatory Tracker in line with WSIS Action Line C7 on ICT applications.[70]

Within the framework of an ESCWA initiative, directors of e-government in the Arab region established the first e-leaders regional network in 2013. The network has a platform for meeting and discussing challenges, priorities and opportunities related to furthering e-government development and supporting relevant practices in the region. The activities of the platform include reviewing and discussing project proposals on e-government development, strengthening the assessment of e-government programmes, building partnerships with the private sector, and building a regional consensus on e-government.[71] Among the most recent priorities are assessing the potential and challenges of open data in the region and reviewing the experiences of Governments with open data. The initiative also highlights the need for the continued development of legislation and legal frameworks pertaining to e-government and for a review and analysis of preliminary survey results for the Government Electronic and Mobile Services (GEMS) Maturity Index, in which 12 Arab countries are assessed (see box 3.7).[72]

The main theme of the thirtieth session of ESCWA, held in Beirut from 25 to 28 June 2018, was technology for sustainable development in the Arab region. Three ministerial-level round-table discussions were held during the session focusing "on integrating technology and innovation into national development planning; the role of technology in tackling the challenges of the Arab region; and frontier technologies: opportunities, challenges and the way forward".[73] The session concluded with the adoption of the Beirut Consensus on Technology for Sustainable Development in the Arab Region. In the Consensus, the representatives of the ESCWA member countries share their "firm belief that technology and innovation are key enablers of the 2030 Agenda and can provide creative solutions to achieve people-centred, sustainable and inclusive development" (para. 4). The focal points in the Consensus include enabling technological ecosystems, dynamic educational systems for twenty-first century skill development and decent employment opportunities, technology-driven social inclusion, supportive governance, environmental sustainability, conflict mitigation and disaster risk reduction, and financing technology for sustainable development.[74]

The ESCWA project on institutional development to promote participatory approaches towards the achievement of the Sustainable Development Goals in Western Asia focuses on fostering open government through the use of modern technologies to enhance transparency and accountability and to facilitate the adoption of a participatory approach to governance in the Arab region.[75] In support of this objective, ESCWA has designed a four-phase open government implementation framework that takes into account "the status of Arab countries and their readiness to move towards an open government in all respects".[76] As part of the same project, ESCWA has prepared capacity-development material on open data[77] and on participation, collaboration and engagement.[78] ESCWA has also promoted open government in the Arab region through regional and national capacity-building workshops and has provided advisory services relating to open government and open data to the Governments of Jordan, the State of Palestine and the Syrian Arab Republic.

Box 3.7 Framework of the Government Electronic and Mobile Services (GEMS) Maturity Index

The GEMS Maturity Index is measured across three sub-indices:

1. **Service Availability and Sophistication:** What government services are available online or via mobile applications, and how sophisticated are these digital services? How accessible is government data via these channels? Metrics for measurement include:

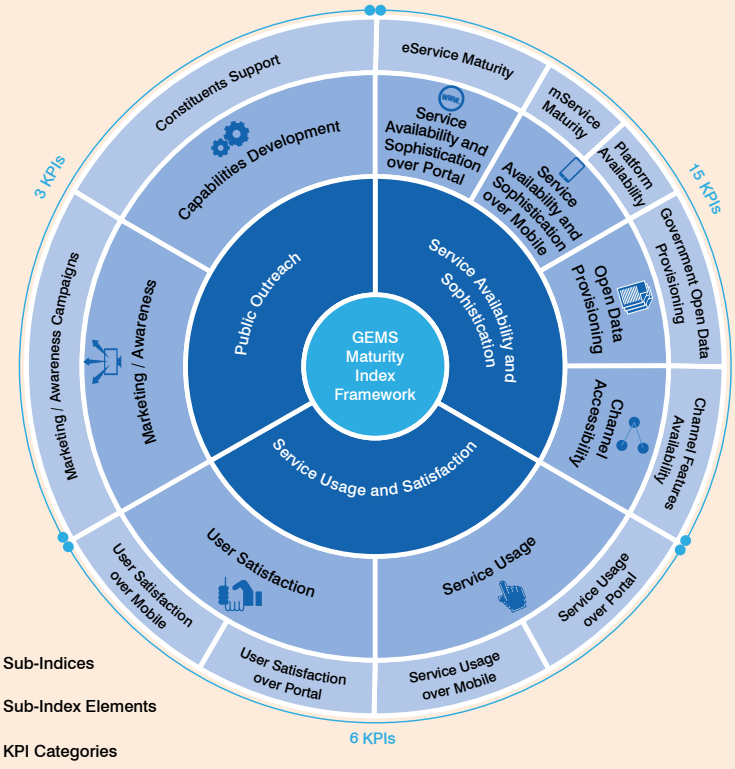
- The digitization level of specific services over portal or mobile channels—i.e., whether every step in a particular process is digitally accessible;
- The degree to which end users have the option to personalize the digital experience.

2. **Service Usage and Satisfaction:** How frequent are these digital services used? How satisfied are end users with the experience? Metrics for measurement include:

- Usage levels over portal and mobile channels for priority digital services;
- End users' satisfaction with these digital services, based on users' reviews and the number of complaints.

3. **Public Outreach:** What have Governments done to make constituents/citizens aware of digital services? How have they supported constituents in using these digital services? Metrics for measurement include:

- The robustness of marketing campaigns accompanying the digital services;
- The degree to which users have access to support in using the digital services—such as live chat, e-mail support, or FAQs.



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Note: KPI = key performance indicator.

3.2.5 Latin America and the Caribbean

Countries in Latin America and the Caribbean have been actively engaged in e-government development since the beginning of the twenty-first century. Various initiatives carried out in the region have focused on priorities such as encouraging e-participation, promoting evidence-based knowledge generation, and improving technology access for vulnerable groups.[79]

Regional challenges and priorities

Although Internet connectivity has improved somewhat in recent years, about 50 per cent of households in Latin America and the Caribbean still lack Internet access.[80] The potential of e-government and e-participation initiatives cannot be fully realized if only half of the population can be reached. In parts of the region—particularly in the Caribbean—Internet affordability is an issue, and levels of human capital development remain low.[81] In Haiti, for example, the unemployment rate is more than 40 per cent, and the literacy rate is only around 60 per cent. Economic and social barriers create immense challenges for Governments endeavouring to leave no one behind in the provision of public sector e-services.

Governments in the region also face challenges in terms of spurring technology-driven growth in the private sector. While many of the larger companies in Latin America and the Caribbean use digital technologies (including AI, IoT and big data in a limited way), small and medium-sized enterprises (SMEs) often lack the resources to invest in digital technologies and may be unable to assess the attendant risks.[82] Supporting technology adoption among such businesses should be a national priority, as various studies have shown a positive correlation between the use of technology and superior economic performance among SMEs.[83]

Digital connectivity facilitates interaction between customers and suppliers. However, as noted above, increasing the use of technology within the private economy has remained a key challenge for the region. One recent study indicates that per capita growth rates relating to network devices and connections are still very low.[84] Generally, the region lacks laws and regulations that can help create a solid institutional framework for the introduction and broad dissemination of ICT and its intensive use among commercial businesses—particularly SMEs.

Human capital deficits constitute a major challenge to ICT development in the region. Simply put, there are not enough skilled workers to adequately support digital transformation. In 2012, 145,000 engineers graduated from educational institutions in Latin America; in the United States, which has around half the population of Latin America, 293,000 students graduated with engineering degrees. Latin American and Caribbean countries have proportionally fewer engineers than do other countries at similar levels of economic development.[85] This human capital scarcity represents a tremendous challenge for regional public institutions and private sector companies needing to acquire innovative new technologies that will allow them to remain competitive in their fields and responsive to customer needs.

The exchange of knowledge, data and digital information within and between the public and private sectors is weak in Latin America and the Caribbean. Consequently, not enough is known about public sector needs and private sector requirements to foster economic and social development through digitalization. Governments alone do not have sufficient financial resources or human capital to build the foundations and develop the tools needed to support e-government initiatives. They require the expertise and resources of private technology companies to be able to create effective platforms for the provision of e-services to individuals and businesses.

Digital technology use among vulnerable groups remains limited in most Latin American and Caribbean countries. Improving ICT and Internet access for children and persons with disabilities has been a challenge, though some progress is being made on this front. In 2016, the Economic Commission for Latin America and the Caribbean (ECLAC) and the Development Bank of Latin America organized a series of cross-sectoral forums to determine how best to integrate digital technologies and relevant skills development in schools and thereby improve the quality of education.[86] In 2019, the English-speaking countries of the Member and Associate Member Countries of the Caribbean Development and Cooperation Committee organized training sessions for people with disabilities to help them acquire the skills and knowledge they need to access and utilize digital public services.

Although there are a number of challenges to be addressed, there are also many promising opportunities that, if leveraged appropriately, can move the digital transformation process forward in Latin America and the Caribbean. The region has what might be considered a demographic advantage in that young people under the age of 25 constitute a significantly high proportion (80 per cent) of the population.[87] Various reports and studies have confirmed that young people are the driving force behind digitalization and innovation. This "youth advantage" and rapid urbanization in the region are likely to contribute to greater openness to and engagement in a data-driven and information-oriented future.[88]

Although a number of countries in the region still lack widespread broadband connectivity, others have made important strides in ICT infrastructure development in recent years. In 2010, Brazil implemented the Plano Nacional de Banda Larga (PNBL), which has created an affordable 25,000-kilometre broadband network that extends to various less developed municipalities.[89] The implementation of the Plan Vive Digital strategy in Colombia has increased ICT availability and demand, particularly among some of the more vulnerable groups in society.[90] There are a number of regional cooperation and knowledge-sharing mechanisms for Latin American and Caribbean countries—including ECLAC, the Caribbean Centre for Development Administration, the Latin American Centre for Development Administration, and the Network of e-Government Leaders of Latin America and the Caribbean (Red GEALC)—and entities such as these collectively offer countries a platform for working together to achieve regional digital transformation. Such forums can also provide broadband "laggards" with an opportunity to learn from effective expansion and outreach models such as those employed in Brazil and Colombia. While a one-size-fits-all model for widening broadband access is not possible within the heterogenous institutional environment of Latin American and Caribbean countries, sharing successful experiences can go a long way.

Accelerated regional efforts to broaden technology access are especially important for the most fragile multi-island countries in the Caribbean, as they are often very fragmented small economies with one-island governance structures and institutions. Having better access to ICT and a more digitally connected population and business sector can help improve the delivery of public services and minimize the impact of distance and diseconomies of scale for local companies.[91]

Regional initiatives and partnerships

Representatives of the countries of Latin America and the Caribbean, convened by ECLAC and the Government of Brazil at the Latin American and Caribbean Seminar on Information Technology and Development, adopted the Declaration of Florianopolis on the use of information and communications technologies (ICT) for development in the summer of 2000. Since then, through various ministerial conferences and new declarations, the region has deepened its commitment to becoming an information society. Most recently, this commitment was strengthened at the Sixth Ministerial Conference on the Information Society in Latin America and the Caribbean (eLAC2020), held in Cartagena de Indias, Colombia, from 18 to 20 April 2018.[92] There, the countries of the

region committed to expanding the digital ecosystem, e-commerce, access to public information, and privacy protections in alignment with the SDGs.

In 2003, Red GEALC was created to bring together the key players in e-government development in the region (see box 3.8).

Box 3.8 Network of e-Government Leaders of Latin America and the Caribbean

The Network of e-Government Leaders of Latin America and the Caribbean (Red GEALC) was established in 2003 to promote horizontal cooperation and the exchange of expertise between the region's countries. Horizontal cooperation between Governments allows the generation and dissemination of knowledge relating to the digitalization of public services. This cooperation is facilitated through a variety of mechanisms, including an e-government expert database, e-government awards ceremonies, training courses for e-government officials, and virtual working groups.

Red GEALC established the Horizontal Cooperation Fund to support brief visits by experts to other countries in the region. The aim is for experts to learn how e-government works in other countries and to implement promising practices in their home countries. For these exchanges, Red GEALC covers travel expenses, the advisory Government provides the expert's salary, and the beneficiary Government finances local stay expenses. At the most recent Red GEALC annual meeting in 2018, 16 Latin American countries and 6 Caribbean countries signed the Declaration of Panama to further strengthen the work of Red GEALC in facilitating e-government cooperation between relevant public officials in the region.

Sources: Red GEALC website (http://www.redgealc.org/).

In recent years, a number of Latin American countries and ECLAC have worked on fostering collaboration with the private sector—including companies such as Telefónica, IBM, Microsoft and regional multinational banks—on data-related activities.[93] While public-private data partnerships are limited at this point, private companies and NGOs are working on developing collaborative relationships with data partners to accelerate economic and social progress in Latin America.

Telefónica[94] and the Centre for International Strategic Thinking[95] are part of the Global Partnership for Sustainable Development Data. In 2016, they signed a joint agreement to establish Data Republica, a data laboratory designed to strengthen the data ecosystem for sustainable development in Latin America. This initiative promotes capacity-building, evidence-based knowledge generation and sharing, and the development of data ecosystems aligned with the SDGs. More specifically, "the platform collects and centralizes data from different institutions and associates them with the 17 Sustainable Development Goals in order to identify the information available to measure ODS indicators".[96]

3.3 Conclusions and recommendations

Digital transformation priorities differ from one region to another, though there is some overlap. In the ECA region, these priorities include digital trade, digital economy and open government data, and the latter two are also considered key regional priorities in the ESCWA region. Trade and transport facilitation remain the primary focus of technology adaptation in the ECE member countries, while in the ESCAP region disaster risk reduction is an urgent priority, with ICT and e-government development focused on providing solutions. The priorities in the ECLAC region lean more towards the large-scale (rather than gradual or incremental) digitalization of core public-sector functions and the adoption of strategic implementation plans in all countries.

Digital transformation efforts at the regional level are both a reflection of and a response to development challenges and highlight the importance of digitalization in virtually every aspect of sustainable development. As stated in the 2030 Agenda, "the spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide and to develop knowledge societies, as does scientific and technological innovation across areas as diverse as medicine and energy" (para. 15).[97]

A review of regional challenges and opportunities indicates that there are aspects or areas of e-government development and digital transformation that essentially constitute global focal points; virtually all Governments have identified these as areas requiring or receiving attention within the framework of national and/or regional plans and strategies. The areas associated with digital development challenges or opportunities in the region include the following: (a) political will (leadership commitment) and institutional capacities; (b) technology diffusion and connectivity; (c) digital trade and digital economy; (d) open data, data inclusiveness and the engagement of the population; (e) digital skills; (f) economic empowerment and the gender divide; and (g) smart cities and urbanization. LDCs, LLDCs and SIDS recognize the importance of these areas and to the extent possible are engaged in relevant activities; however, many of the countries in special situations continue to deal with the more fundamental challenges associated with ICT development and digitalization, including affordability, connectivity, security, infrastructure, and the digital divide. Addressing these challenges through concerted efforts and partnerships remains a priority for the international community.

This chapter also highlights a number of promising initiatives. Smart Africa, PRIDA, AP-IS, the Digital Silk Road, SAMOA Pathway, D4D, SPECA, UN/CEFACT, Red GEALC, the ESCWA e-leadership initiative, and the many regional networks and forums that have emerged are evidence of the growing understanding that challenges and opportunities linked to digital transformation can best be addressed through interregional and intraregional cooperation.

A qualitative cross-regional analysis that integrates input from the United Nations regional commissions indicates that efforts are being made to strengthen regional cooperation that builds upon the current strong political commitment to ensure the alignment of strategies, policies and actions in the following critical areas:

- Connectivity and interoperability (AP-IS, Digital Silk Road/BRI, D4D, PRIDA);
- Open government (Data Republica/ECLAC; numerous open data initiatives/ESCWA);
- Digital identification, digital economy and digital trade (digital ID and digital economy strategies and initiatives in Africa; UN/CEFACT);
- Regulatory frameworks (PRIDA/Africa; D4D/Europe).

The national and regional digitalization efforts that have been undertaken and the digital strategies that are being developed for future growth reflect a strong commitment to unleashing the potential of new technologies to drive sustainable development. Although there remains a long road ahead, the integrated national/intraregional/interregional approach to digital transformation is beginning to bear fruit in many regions. In this era of increased interdependence and accelerated change (largely driven by advances in digital technology), strengthening digital cooperation and cross-border partnerships is the best way to address relevant challenges and opportunities.

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4. Local E-Government Development in Cities and Human Settlements

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4.1 Introduction

Innovation and technology development have disrupted traditional practices and the organization of societies. Information and communications technology (ICT), now widely utilized in all sectors of society, is playing an increasingly important role in interactions between Governments and people. There is a broad consensus that ICT can be used to increase the quality of service delivery, improve the efficiency of public institutions, reach large numbers of people, promote transparency and accountability, facilitate electronic interaction and participation, and mitigate corruption. However, technology evolves so rapidly that it becomes necessary to continuously "chase the digital wave";[1] it is therefore of the utmost importance that research be conducted to generate a better and more thorough understanding of the role of ICT in a globalized world and how Governments and public institutions can better use digital technology to achieve their development objectives.

Governments leverage digital technologies to strengthen public administration at all levels; ICT integration can expand and improve services provision, streamline and optimize internal processes, and allow residents to engage with institutions and public issues in multiple ways both nationally and locally. The importance of local government is sometimes overlooked or undervalued; however, as highlighted in the New Urban Agenda, international organizations are well aware that the contribution of subnational and local governments to policy definition and implementation is as important as that of national Governments.[2]

Local governments are increasingly embracing digital technologies for a variety of purposes. Many use ICT to disclose and disseminate public information. Municipalities can share details relating to their plans and objectives, daily operations, and service offerings (including mechanisms for interacting with local government). Digital platforms can also be used for outreach. Cities can engage in creative marketing and promote local tourism among wider (and often specifically targeted) audiences. ICT plays an important role in facilitating communication and consultation, enabling a wide range of stakeholders to interact with and participate in local governance and contribute to decision-making either directly or indirectly. Multistakeholderism is gaining a foothold in local contexts as digitalization offers expanded opportunities for a range of different actors to become involved in virtually every aspect of policy deliberation processes. Using ICT for services delivery helps local governments streamline operations and reduce their administrative burden, facilitates remote interaction with the public and more efficient

internal communication and collaboration, and increases overall efficiency in a way that is friendly to the environment.

People tend to have more direct interaction with local governments—which places the latter in a unique position to respond to the needs and concerns of residents. This proximity to local communities forms the core of the discourse around the kind of role local governments should play in enhancing the quality of life and well-being of those who live within their jurisdictions. People are often more invested in what is happening in their local communities, as local governments deal directly with issues affecting their daily lives in areas such as education, social services and city management. There is a sense of belonging and ownership, and local residents are often given the opportunity to see concrete results from their interaction and involvement with local governments.

People look directly to local governments for information and problem resolution. In some situations, residents make an effort to get closer to their local authorities because they want to become more involved with public issues. There is often a close relationship between these three drivers; people may need information so that they can become more involved and participate more directly in resolving problems.

E-government development is high on political agendas, but the emphasis has mainly been on national priorities and progress, as is evidenced by the many regional and international initiatives and publications assessing the growth and effectiveness of e-government at the country level; examples include the United Nations E-Government Survey (2001 to present), the European Union eGovernment Benchmark, and the Organization for Economic Cooperation and Development (OECD) Digital Government Review for individual countries. Broader global assessment initiatives relating to emerging technologies include the Artificial Intelligence Index launched by Stanford University, the Government AI Readiness Index from Oxford Insights, the World Bank Open Data Readiness Assessment, the World Wide Web Foundation's Open Data Barometer, the Global Open Data Index, and the OECD Open Government Data Report.

There are well-established mechanisms for assessing progress in national e-government development,[3] but the assessment of local e-government maturity is in the early stages and remains relatively rare. Cities are essentially a collection of human, social, economic and cultural networks and are settings in which a sense of belonging and togetherness can be fostered and in which the public processes that support social cohesiveness and development can be optimized and made more efficient and efficacious. Towards this end, increased attention should be given to assessing the online presence of local government in cities—a fundamental aspect of e-government. A logical starting point is assessing the role of cities as service providers and examining city portals as the key mechanism for e-government in such contexts.

Focusing on important local channels for public information, communication and services worldwide, this chapter presents the results of a study assessing the e-government portals of selected cities using the Local Online Service Index (LOSI). This process was initiated in 2018 as a pilot study assessing portals in 40 cities and seeks to continue to provide evidence-based data to contribute to the assessment of progress made in local e-government development. Specifically, this chapter aims to address the following research questions: What is the current status of cities' online presence worldwide? What is the current level of maturity of cities' online portals in terms of technological features, content and services provision, and mechanisms for local participation and engagement?

As in 2018, the 2020 (second) edition of the study is the result of close collaboration between the Division for Public Institutions and Digital Government of the United Nations Department of Economic and Social Affairs (UN DESA) and the United Nations University Operating Unit on Policy-

Driven Electronic Governance (UNU-EGOV). This chapter represents part of a continuing effort to assess local e-government as reflected in the online presence of major cities.

The publication of the first edition generated strong interest and substantial positive feedback. The current edition aims to strengthen the notion that assessing city portals contributes to the improvement of local e-government, based on the idea that if something cannot be measured or assessed, it cannot be improved. Assessment thus becomes a "critical success factor for the development" of online services provision,[4] which ideally should incorporate a broad range of features, including facilitative technology. The LOSI measures both technical and content aspects of the portals, as well as the electronic services and e-participation initiatives available through them.

In the 2020 study, the assessment was scaled up to include 100 cities in different regions of the world. The need to enhance the range and quality of services and to optimize the integration of evolving technologies to achieve this goal drives governments to improve their online presence. National and local governments are engaged in a growing effort to capitalize on the benefits ICT offers in public services provision, including greater social inclusion, enhanced efficiency and effectiveness, more personalized service delivery, and 24/7 service availability.

The burgeoning interest in e-government development, combined with the growing number of requests for inclusion and representation in the local e-government survey, led the study organizers to increase the number of cities assessed for the 2020 Survey. This has been a positive development, as assessing a much larger number of portals confers the following benefits:

- Broader coverage and representation of the status/maturity of local e-government;
- A more comprehensive and complete portrait of local e-government worldwide, with the larger survey sample allowing more accurate insights, more consistent analysis, and the opportunity to better identify the challenges, difficulties and opportunities cities have in common (and where there is divergence);
- The opportunity to engage in broader evidence-based analysis of the online presence of local governments worldwide, with increased capacity for productive comparisons and the ability to identify areas in need of improvement;
- The establishment of a network of experts and practitioners that can share good practices and lessons learned.

4.2 Local e-government

4.2.1 Methodology

The LOSI comprises 80 indicators relating to four criteria: technology, content provision, services provision, and participation and engagement. The technology dimension focuses on technical features of the portals to specify how the site and content are made available for users; relevant indicators relate to factors such as accessibility, quality, functionality, reliability, ease of navigation, visual appeal, and alignment with technology standards. For content provision, the aim is to identify the extent to which essential public information and resources are available online. The third criterion is services provision, focusing on the availability and delivery of targeted government services, and the fourth and final criterion is participation and engagement, which assesses the availability of mechanisms and initiatives for interaction and opportunities for public participation in local governance structures. More comprehensive information on the 2020 survey methodology and LOSI indicators is available in the annexes.

Two important factors informed the selection of the 80 indicators used in the assessment instrument. A literature review and previous empirical research helped determine which set of metrics best represented the central elements of digital public services and services provision at the city level. In addition, an effort was made to align the LOSI indicators with the Online Service Index (OSI)—a decision based on some of the comments received after the first edition of the study was released in 2018.

Each of the 80 LOSI indicators generated a binary question in the Local Government Questionnaire (LGQ). Each indicator was ascribed a value of 1 if it was found in a city portal (yes) and a value of 0 if it was absent (no). The overall LOSI value for a city is the normalized value of the 80 indicators for that city. Based on the LOSI calculated value, the top-down ranking shows the relative position of the city among all those measured. Based on the total number of indicators met, cities are assigned to one of four levels or groups ranging from very high to low. Cities with a very high LOSI level are those that meet at least 60 of the 80 indicators analysed and have LOSI values between 0.75 and 1.00. Cities in the high LOSI group meet between 40 and 59 indicators and have LOSI values in the range of 0.50 to 0.75. In the middle LOSI group are those cities that meet 20 to 39 indicators and have LOSI values in the range of 0.25 to 0.50. Finally, cities in the low LOSI group meet fewer than 20 indicators and have LOSI values between 0.00 and 0.25.[5]

To obtain the LOSI survey results for 2020, a total of 148 volunteer researchers in 86 countries (using 41 languages) assessed the selected city portals and other related portals, as applicable, using the LGQ.

The data collection and survey research took place during the second half of 2019. Each city's portal was assessed by at least two researchers, who conducted the assessment in one of the national languages of the country in which the city was located. After the initial assessment, the evaluations by the two researchers for each city were compared, and any discrepancies were reviewed together and resolved by the researchers. A final review and verification of all the answers was carried out by a senior reviewer. Once the LOSI value was approved by the senior reviewer, the statistics team assigned the LOSI ranking.

4.2.2 Current status of local online services

The 100 cities surveyed for the 2020 LOSI were selected based on geographical location and population distribution. All of the world regions were equitably represented; the number of countries selected from each region was based on the share of that region's population in the global population. Among the 100 cities chosen, 29 were in Asia, 32 were in Africa, 21 were in Europe, 16 were in the Americas, and 2 were in Oceania. Fourteen of these cities (11 in Africa, 2 in Asia and 1 in the Americas) were found not to have a web portal.[6]

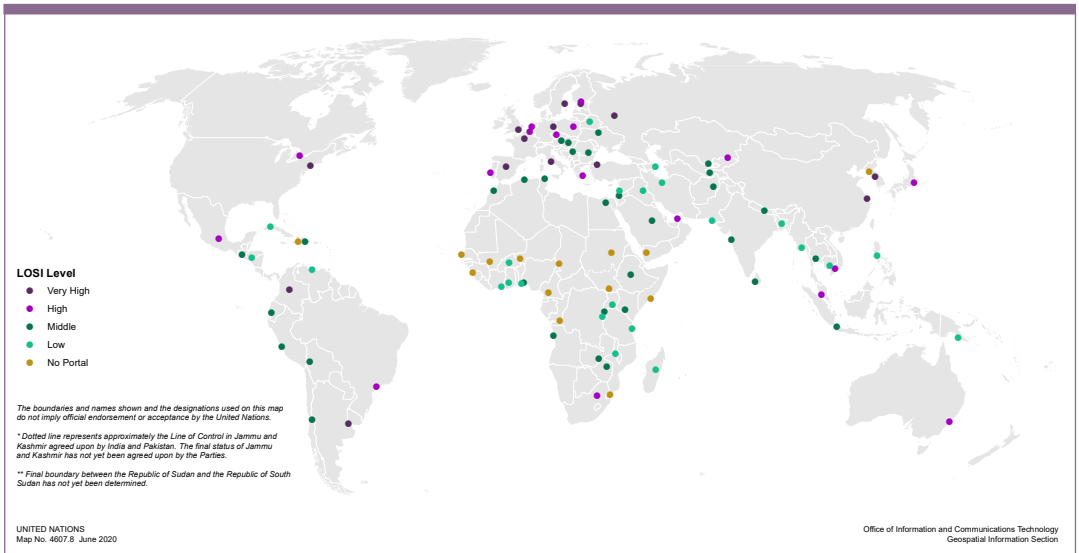
For this reason, the 2020 LOSI assessed 86 city portals—27 in Asia, 21 in Africa, 21 in Europe, 15 in the Americas and 2 in Oceania.

The final ranking of cities reflects the total number of indicators met; the respective LOSI values are detailed in the annexes.

As mentioned above, each city was assigned to one of four LOSI levels—very high, high, middle or low—based on its LOSI value. Figure 4.2 shows that 14 cities (16 per cent) are in the very high LOSI group, 16 cities (19 per cent) are in the high LOSI group, 33 cities (38 per cent) are in the middle LOSI group, and 23 cities (27 per cent) are in the low LOSI group (see annexes). The map shown in figure 4.1 represents the distribution of the cities based on the four LOSI levels.

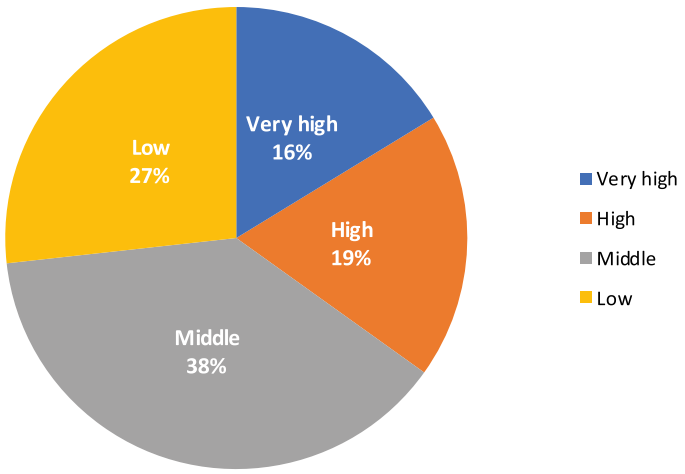
The cities with the highest LOSI values for 2020 are Madrid (ranked 1st), New York (2nd), Tallinn (3rd), Paris and Stockholm (4th), Moscow (6th), Bogota and Buenos Aires (7th), Berlin, Seoul and Shanghai (9th), and London, Istanbul and Rome (12th). The 2020 survey results indicate that 10 of the top 20 cities are in Europe, 6 are in the Americas, and 4 are in Asia; none of the cities assessed in Africa or Oceania rank among the top 20. The average LOSI value for all of the cities surveyed is 0.43125, and the survey results indicate that 39 cities have LOSI values above the world average.

Figure 4.1 Number and percentage of cities at each LOSI level



Source: 2020 United Nations E-Government Survey.

Figure 4.2 Distribution of the cities assessed based on LOSI level

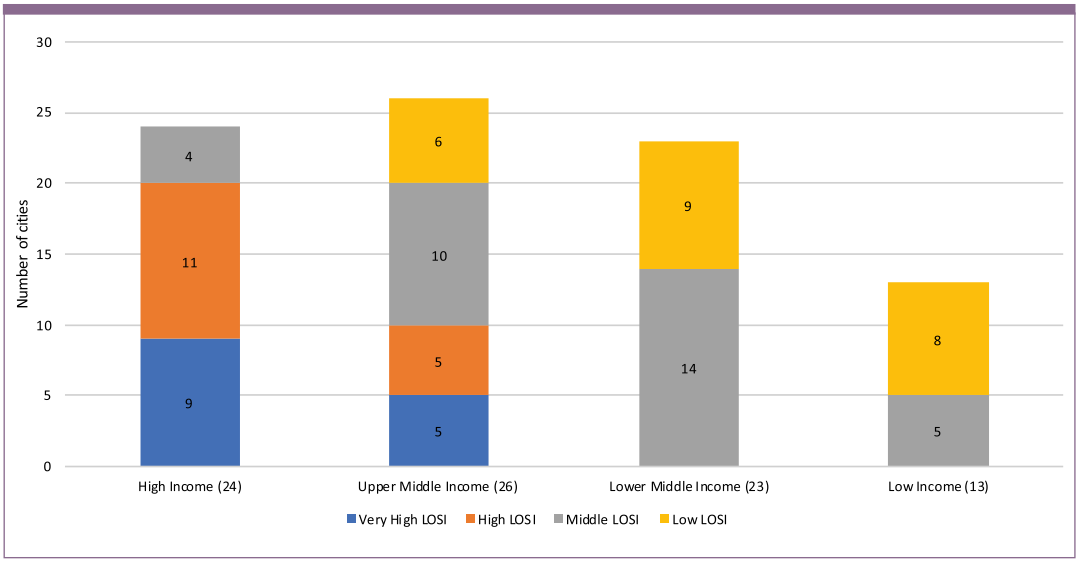


Distribution of LOSI levels by income group

Figure 4.3 shows the distribution of LOSI levels among national income groups. While assumptions of a positive relationship between the LOSI level of a city and the income group of the country in which the city is located are largely borne out by the results, deeper analysis of the survey findings might prove beneficial, as more than a dozen of the countries surveyed demonstrate divergence in these areas. Budapest, Riyadh, Santiago and Vienna are cities in high-income countries but have middle

LOSI values. By contrast, Bogota, Buenos Aires, Istanbul, Moscow and Shanghai are in upper-middle-income countries but have very high LOSI levels. Meanwhile, Baku, Baghdad, Caracas, Havana, Minsk and Tehran are located in upper-middle-income countries but have low LOSI levels. This suggests that effective local e-government development may require not only sufficient financial resources but also an enabling environment and targeted support mechanisms such as a comprehensive local e-government vision and strategy.

Figure 4.3 Number of cities by LOSI levels and national income groups



LOSI levels with corresponding OSI levels for 2020

This subsection reviews the assessment results for local e-government development alongside those for a subindex of national e-government development in the countries in which the assessed cities are located. LOSI and corresponding Online Services Index (OSI) levels are presented for this purpose. Detailed information on OSI values, levels and groupings is provided in chapter 1 of this report. Briefly, countries are assigned one of four OSI levels based on their OSI values, as follows: very high (0.75 to 1.00), high (0.50 to 0.75), middle (0.25 to 0.50), and low (0.00 to 0.25).[7]

Table 4.1 shows the numbers and percentages of cities with LOSI values that correspond to or diverge from the OSI values for the countries in which they are located. The intention is not to invite a comparison of LOSI and OSI levels, but rather to highlight discrepancies between the development of local/city e-government portals and the development of national e-government portals in the countries to which the cities belong. Among the 86 cities assessed in 2020, 25 are at LOSI levels that correspond to the OSI levels for their respective countries (green-shaded cells). Notably, 60 cities are at LOSI levels that are lower than their countries' OSI levels (red-shaded cells). Among these cities, 20 have LOSI values that place them two levels below their countries' OSI levels: 9 cities are at the middle LOSI level while their countries are at the very high OSI level, and 11 cities are at the low LOSI level while their countries are at the high OSI level. In only one case has a city reached a LOSI level higher than its country's OSI level (blue-shaded cell). More specific information on the relevant 2020 LOSI and OSI levels is available in the annexes.

The discrepancies between local and national e-government development are verified in both the 2018 and 2020 editions of the LOSI study. The 2020 review indicates that around 70 per cent of the cities surveyed have LOSI levels that are lower than the OSI levels for the countries in which they are located - up from 42.5 per cent in 2018.

Table 4.1 LOSI and OSI levels: convergence and divergence. (Number and percentage of cities)

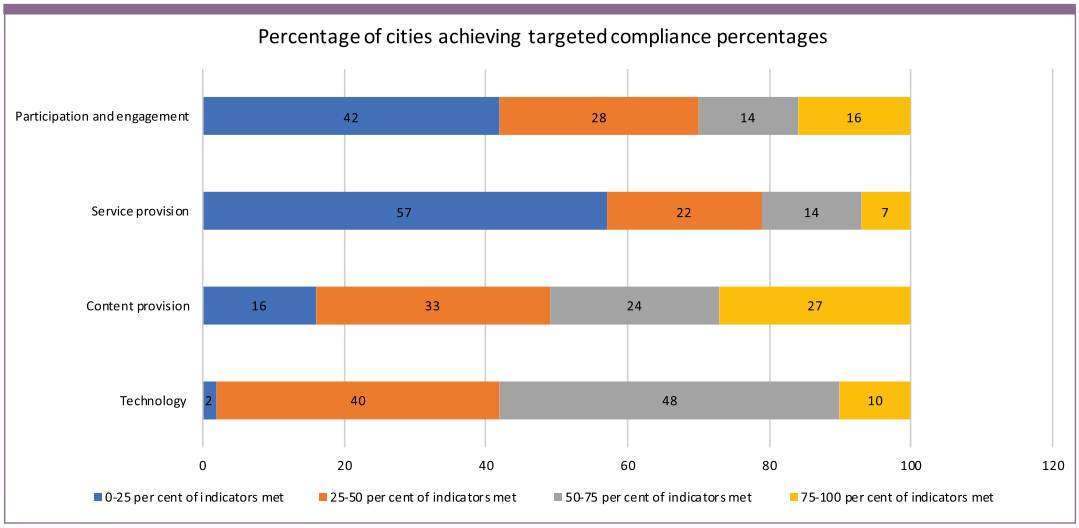
	Very high OSI 2020	High OSI 2020	Middle 0SI 2020	Low OSI 2020
Very high LOSI 2020	13 (15.1%)	1 (1.2%)	None	None
High LOSI 2020	12 (13.9%)	4 (4.7%)	None	None
Middle LOSI 2020	9 (10.5%)	16 (18.6%)	8 (9.3%)	None
Low LOSI 2020	None	11 (12.8%)	12 (13.9%)	None

The findings of this parallel review of 2020 LOSI and OSI levels confirm the assertion in the 2018 edition that the disparities between local and national e-government performance may be more marked when a wider local e-government assessment is conducted. In 2018 only 40 cities were assessed, compared with 86 in 2020.

Implementation of LOSI indicators in city portals

As shown in figure 4.4, only 10 per cent of the city portals assessed have implemented 75 to 100 per cent of the 12 technology indicators measured, while 48 per cent have implemented between 50 and 75 per cent of these indicators. High compliance is most evident for content provision; 27 per cent of the city portals assessed have met 75 to 100 per cent of the 32 content provision indicators, while 24 per cent have achieved 50 to 75 per cent compliance for this criterion. While 16 per cent of the city portals assessed have implemented 75 to 100 per cent of the 11 participation and engagement indicators, only 7 per cent have implemented 75 to 100 per cent of the 25 services provision indicators.

Figure 4.4 Implementation of LOSI indicators in city e-government portals



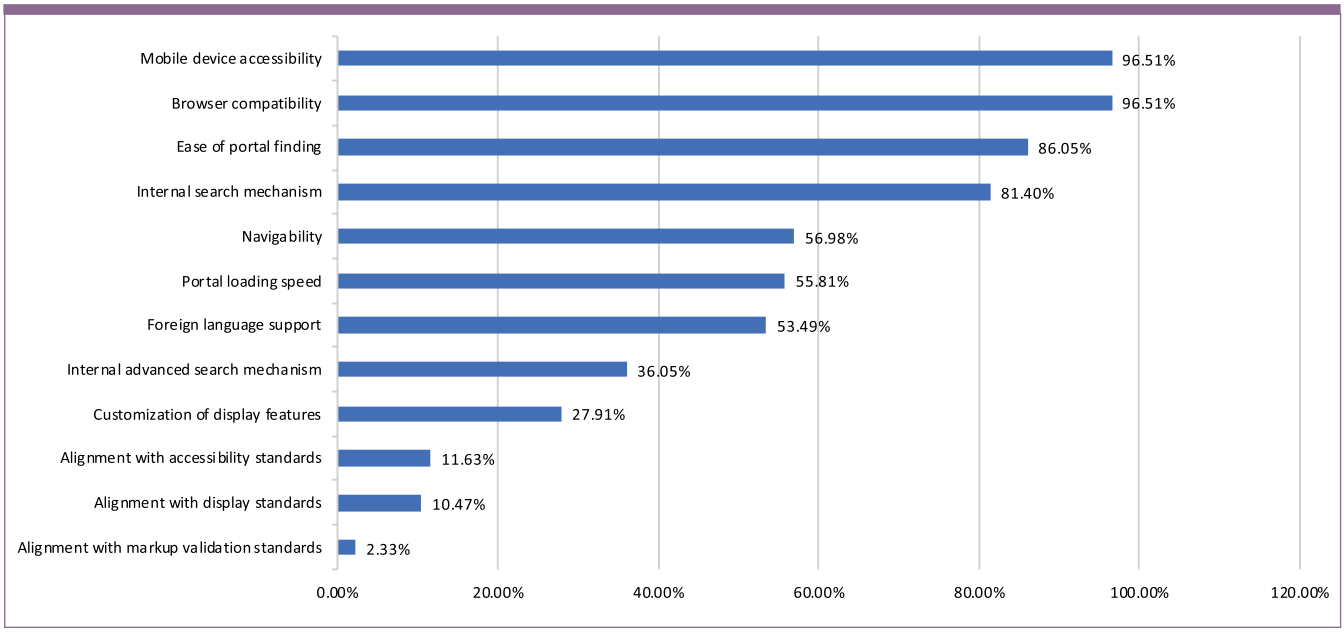
Implementation of technology indicators in city portals

Figure 4.5 shows that the technology indicators most frequently met relate to portal compatibility with different web browsers, portal accessibility through mobile devices, the ease with which the city portal can be found, and search feature availability in the city portal. Similar to the 2018 LOSI findings, almost all city portals (96.5 per cent) are accessible through mobile platforms; this has

particular relevance considering the high penetration of mobile devices. Notably, only about half of the city portals studied are easy to navigate, are able to load in less than five seconds,[8] and provide their portal content in more than one language. Further, only 36.1 per cent of the city portals offer advanced search options, and only 27.9 per cent allow users to customize portal display options such as font type, size and colour.

The survey results indicate that the majority of the city portals assessed are not compliant with the Web Content Accessibility Guidelines 1.0; only 10 portals (11.6 per cent) meet these standards. Compliance with display and markup validation recommendations by the World Wide Web Consortium (W3C) is also poor, with only 9 and 2 of the city portals (10.5 and 2.3 per cent) satisfying these technology standards.

Figure 4.5 Implementation of technology indicators in city portals



Implementation of content provision indicators in city portals

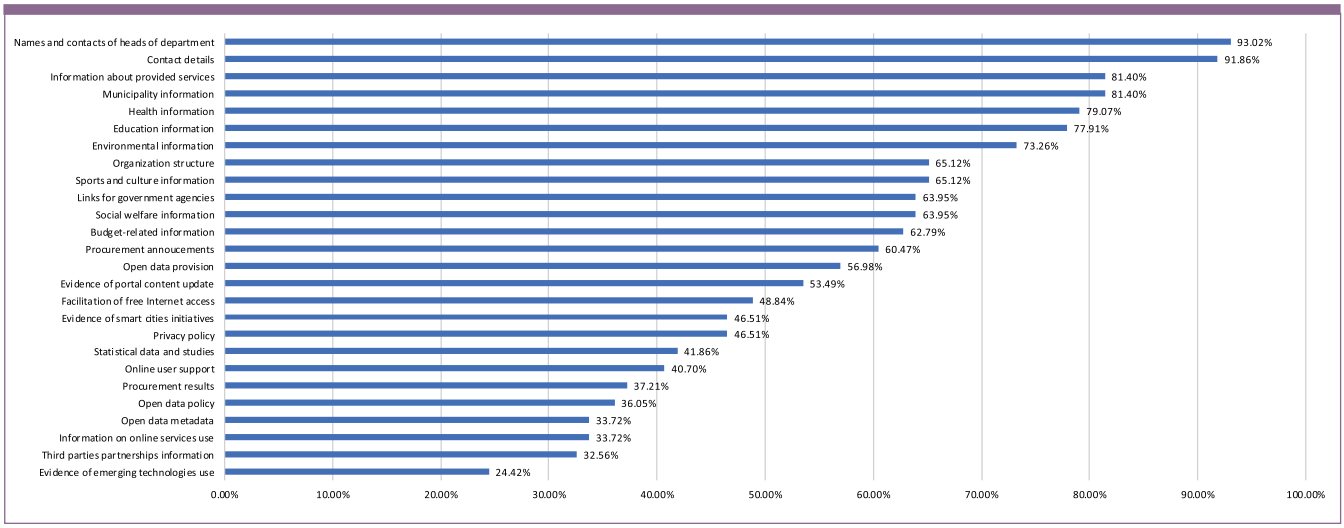
As illustrated in figure 4.6, the content provision indicators met by the largest proportion of city portals relate to information on the names and titles of city/municipality department heads and their functions, their working hours and contact details, and information about the services the portal provides. Most of the city portals also provide a wide (and satisfactory) range of information relating to different sectors, including health, education, environment, social welfare, leisure, culture and sports. Procurement announcements and information on the organization, operations, management and budget of the city/municipality are available on the portals of more than 60 per cent of the cities assessed. Only around a third of the city portals (37.2 per cent) make procurement results and related information available.

More than half of the cities surveyed (53.5 per cent) had updated the content of their portals within the past month. Notably, fewer than half of the cities studied (48.8 per cent) provide free access to government online services through kiosks, community centres, post offices, libraries, public spaces or free Wi-Fi.

Fewer than half of the cities (46.5 per cent) have a privacy policy or statement available on their portal, which denotes insufficient attention to and consideration for people's privacy and limited

awareness of transparency and accountability principles. Additionally, only 36 per cent of the city portals have an open data policy and only 33.8 per cent publish information on usage. On 32.6 per cent of the city portals assessed there is some evidence that services are provided in partnership with third parties, such as civil society or the private sector, and approximately 24.4 per cent indicated that they use emerging technologies.

Figure 4.6 Implementation of content provision indicators in city portals



The portals were also analysed to determine whether the city is using, starting to use, or intends to use ICT in more innovative ways. To assess progress in this area, researchers investigated whether any open government data (OGD) or smart city initiatives were planned or in place and whether emerging technologies such as the Internet of Things (IoT), artificial intelligence (AI), blockchain, virtual reality (VR) or augmented reality (AR) were being considered or used. The survey results show that OGD initiatives are operating in 57.0 per cent of the cities—a strong indication of the willingness of these cities to become more transparent and efficient (see box 4.1). However, only 36.1 per cent of the cities assessed provide an OGD policy establishing the rules and recommendations for publishing and using open data sets, and only one third (33.7 per cent) provide metadata.

Box 4.1 Sydney: data hub

Sydney's data hub makes maps, data stories and open data sets available to the public for general information purposes. Users can access hundreds of data sets organized into sections that provide city-level information on the environment, community, economy, public domain, transport, sustainability, culture, administrative boundaries and planning. The data are typically presented in spreadsheet and/or graphic form, with KML or shapefile formats used for geographic data. This initiative brings value to the community and encourages inclusive and sustainable urbanization (see SDG target 11.3).

Sources: City of Sydney, Data Hub (https://data.cityofsydney.nsw.gov.au/).

The use of or intention to use emerging technologies was found in 24.4 per cent of the cities assessed. This percentage is actually a positive sign, given the very limited general understanding of emerging technologies and their potential applications. Harnessing new technologies requires new technical competencies that may not be readily available at the municipal level, so caution in adoption is appropriate. One interesting application of emerging technology in e-government is the Dubai Electricity and Water Authority's online chatbot Rammas (see box 4.2).

Box 4.2 Dubai: Rammas chatbot

The Dubai Electricity and Water Authority (DEWA) is the first government organization in the emirate to use AI for direct, real-time interaction with customers. In 2017, DEWA launched Rammas, an online chatbot that can communicate with customers and respond to their queries in both Arabic and English. This initiative aims to reduce the number of visitors to DEWA offices by 80 per cent and to further encourage the use of smart channels to support the Smart Dubai initiative. It also supports the efforts of DEWA to enhance the use of AI in alignment with its vision to become an innovative—and more sustainably operated—world-class utility.

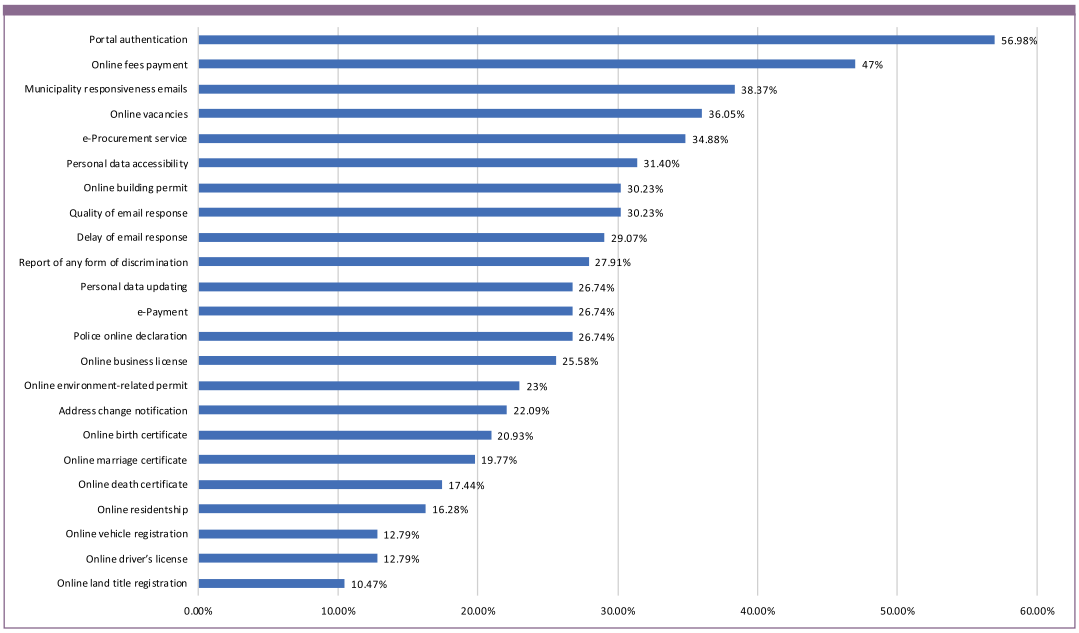
Available through the DEWA smart application, Rammas acts as a virtual employee that is available around the clock. "Rammas responds to customers instantly while continuing to learn and understand their needs based on their enquiries. Rammas … analyses these enquiries based on available data and information and takes action to accurately answer and streamline transactions with ease".

Sources: Dubai Electricity and Water Authority website (https://www.dewa.gov.ae/en/about-us/dewa-digital-journey/rammas); the Rammas chatbot is available at https://www.dewa.gov.ae/en/rammas.

Implementation of services provision indicators in city portals

The survey results for the services provision indicators were substantially lower than those for the technology and content provision indicators (see figure 4.7). User authentication—a basic auxiliary service for the provision of most online services—was the most frequently met indicator but was available on only 49 of the 86 city portals (57.0 per cent). Aside from this basic auxiliary service, 17 specific services were analysed for the 2020 study; 9 of these had been assessed in the previous LOSI study, and 8 were new. Those retained from the 2018 study included access to personal data, personal data updates, residence applications, applications for government vacancies, applications for building permits, change of address notifications, declarations to the municipal police, the submission of tenders through an e-procurement platform, and the payment of fees for government services or fines. The eight new services assessed in the 2020 LOSI included applications for birth, marriage and death certificates, applications for driver's licenses, vehicle registration, land title registration, applications for business licences and patents, and environment-related permits. Each of the 17 services was assigned a value of 1 whether the service was available directly on the city portal or through a link to other e-service portals.

Figure 4.7 Implementation of service provision indicators in city portals



As depicted in figure 4.7, 31.4 per cent of the city portals allow their users to access their own data online, and 26.7 per cent allow them to modify their data. A slightly smaller number of city portals (25.6 per cent) make it possible for businesses to apply for a business permit and access their data online, and only 10.5 per cent of the portals allow for online land title registration.

Municipal fines and other fees can be paid in 46.5 per cent of the city portals; however, online business tax e-payment services are available in only 26.7 per cent of the portals. Tenders can be submitted through e-procurement platforms in 34.9 per cent of the city portals (see box 4.3), and 30.2 per cent of the portals accept online applications for building permits. Applying for government vacancies is possible in 36.1 per cent of the city portals.

Box 4.3 Amman: e-tenders platform

In 2019, the Greater Amman Municipality launched an updated e-tenders platform that lists all local and international procurement opportunities and bid applications for municipal projects/contracts. The platform aims to manage and control the procedures governing tenders with full transparency and to provide bidders with fair and equal opportunities.

All municipal tenders are now submitted electronically and are broadcast during opening sessions and archiving sessions of the Tendering and Procurement Directorate. All information regarding the tenders is published on the website, including announcements and annexes, results of opening tenders, results of prior tenders, technical qualifications of bidders, and appointment decisions. Bidders or their representatives are allowed to attend the public bid opening sessions held by the Directorate.

Sources: Greater Amman Municipality (http://www.gamtenders.gov.jo/).

Only 26.7 per cent of the city portals reviewed allow residents to make declarations to the police, and reporting any form of discrimination is an option in only 27.9 per cent of the portals. The online services provided least often (either directly on the city portal or through a link to other e-service portals) include address change notifications, applications for birth, marriage and death certificates, applications for residency, vehicle registrations, driver's licence applications, and land title registrations. Less than 20 per cent of the city portals provide those services directly or through a link.

Three of the services assessed relate to the handling of email messages sent by residents to local government; the analysis focused on the usage of email and the timeliness and quality of responses. To evaluate these services, an email message containing a simple request (inquiring about official working hours) was sent to the concerned city or municipality. During this process, it was found that not all cities/municipalities provide email addresses on their websites; in some cases, it was possible to send a message through an embedded web form. Overall, 79 of the 86 cities/municipalities offered email contact information, 33 replied to the messages sent, and of those, 25 replied within two working days. Of the 33 replies received, only 26 were considered "useful" or responded directly to the request made.

Although the results for the services provision indicators may seem less than encouraging at this point, the fact is that many of the world's major cities are actively engaged in improving and expanding their online public services offerings; Casablanca is a prime example of this. On 3 May 2020, the municipality of Casablanca announced the launch of a new version of its portal to provide residents with expanded access to dynamic digital content, including data, documents and services; this update constitutes part of the city's efforts to promote digital transformation.[9] Casablanca also has a municipal portal called Casa Store that provides access to certain types of information and services in a way that actively promotes user participation and engagement (see box 4.4).

Box 4.4 Casablanca: Casa Store

In 2018, the city of Casablanca launched the Casa Store portal, a mobile and web application store that incorporates mobile applications and websites relating to the city of Casablanca. This platform is designed to promote interaction and participation and actively facilitates the engagement of residents in the development of their city.

People have access to a wide range of information and services through the portal; for example, they can pay taxes (income tax, business tax and VAT), obtain real-time information (including the latest updates) from the website of the Ministry of Justice of Morocco, browse the open data portal of the city of Casablanca, and apply for government vacancies.

The Casa Store can be accessed by three types of users: visitors, Casa Store users, and developers. Visitors are not required to sign in; however, their activities are limited to searching and viewing the content of the applications. Casa Store users, who are generally local residents, can participate in various activities within the platform and evaluate the content. The third type of users are the developers, who enjoy the same access as the Casa Store users and can also suggest new applications and upload them to the platform.

Sources: Ville de Casablanca (http://www.casastore.ma).

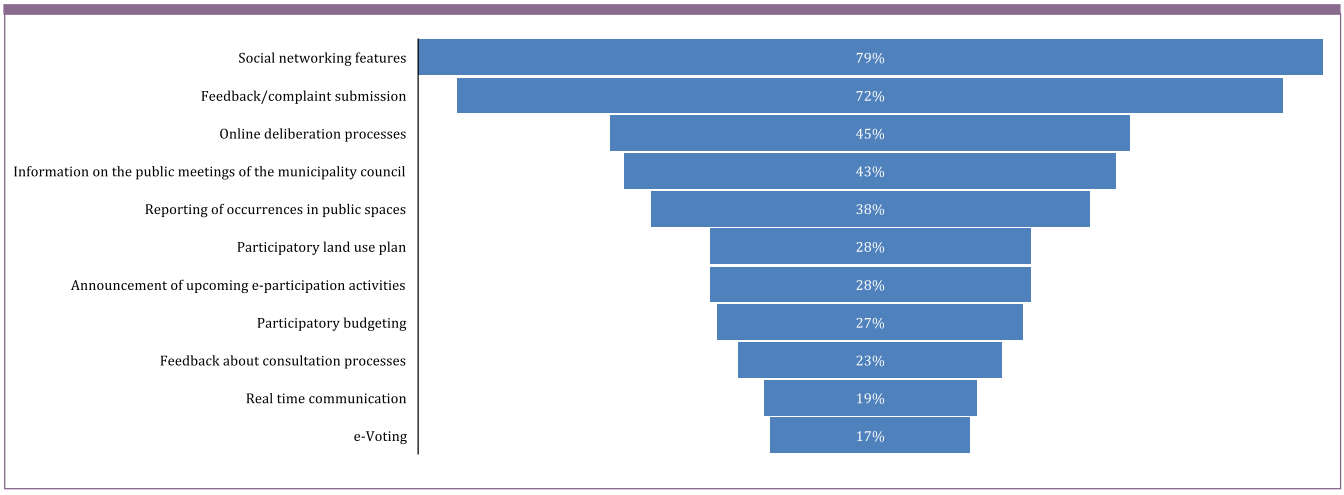
Implementation of participation and engagement indicators in city portals

As shown in figure 4.8, the participation and engagement indicator most frequently met is social network presence, with 79 per cent of the city portals providing links to social media networks such as Facebook, Twitter, YouTube and Flickr.

While different approaches are used to allow residents to file complaints or share their opinions with their local government, this option is available in 72 per cent of the city portals; some portals offer general inquiry options, while others identify specific areas for feedback. Residents often contact city offices to report problems or issues affecting public spaces, such as potholes in the street, broken public lamps, or damage to sports facilities or playgrounds. The survey results suggest that many city residents are still reporting these occurrences using traditional means, as online reporting is available in only 38 per cent of the city portals.

Fewer than half of the city portals (45 per cent) provide tools on their respective websites to engage people in deliberative and decision-making processes, and only 23 per cent of the city portals give

Figure 4.8 Implementation of participation and engagement indicators in city portals



some indication of online public consultation having resulted in a policy decision, regulation or service (though it is fair to mention that not all government processes call for e-participation). Further, only 28 per cent of the portals assessed provide calendar announcements or postings of upcoming online consultations such as voting forums, surveys or polls. Fewer than half of the cities surveyed (43 per cent) provide information on public meetings of the city or municipal council.

Participatory budgeting and participatory land-use planning are two kinds of initiatives used by cities/municipalities to engage with local communities. Participatory budget frameworks are found in only 27 per cent of the city portals studied, though the slight increase from the 23 per cent rate reported in the 2018 LOSI study is encouraging. The opposite is true for people's participation in city land-use planning processes; 28 per cent of the city portals assessed offer relevant initiatives in 2020, compared with 35 per cent in 2018.

Among the city portals studied, 19 per cent offer "live support" features that allow city employees to communicate with users in real time from call centres or through platforms such as WhatsApp. This kind of interaction creates a closer relationship among stakeholders. One interesting example of the provision of live support is New York City's ASL Direct, a video calling system set up to ensure that those who are deaf or hard of hearing have access to city services (see box 4.5).

Box 4.5 New York City: ASL Direct

The City of New York introduced ASL Direct, a video call system that integrates the use of sign language, to provide deaf and hard-of-hearing residents with direct access to city services and information. Through the use of webcams, ASL Direct allows those who are deaf or hard of hearing to communicate with a specialist fluent in American Sign Language (ASL) from the Mayor's Office for People with Disabilities. Those who use ASL Direct are provided with a one-stop shop through which they can access city information and services relating to employment, housing, accessible transportation, emergency management, city accessibility and other areas of interest. This service is provided online and through a mobile app. With this initiative, New York City aims to ensure equitable access to its services for all city residents and to be the most accessible city in the world. Its efforts in this regard are aligned with the SDG target 11.3.2 objective of enhancing inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management.

Sources: City of New York, Mayor's Office for People with Disabilities (https://www1.nyc.gov/site/mopd/initiatives/asl-direct.page)

Even fewer portals (17 per cent) offer online voting tools or systems to facilitate people's involvement in local government decision-making. However, there are two interesting platforms for facilitating people's engagement in decision-making and managing petitions in Madrid and Bogotá (see boxes 4.6 and 4.7).

Highest-ranking cities within each indicator category

The highest-ranking cities in each of the 2020 LOSI indicator categories are shown in table 4.2. The rankings are based on the total number of indicators met in each of the four criterion subgroups (technology, content provision, services provision, and participation and engagement).

In the technology subgroup, Tokyo is the leader, followed by Madrid, New York, Seoul, Shanghai, London, Toronto, Kuala Lumpur and Kabul. Europe has the highest proportion of leading cities as a share of the regional total, followed by Asia and the Americas. Among the European city portals, almost 48 per cent (10 of 21 portals assessed) rank among the highest, while among the Asian city portals, around 37 per cent (10 of 27 portals assessed) rank among the best. Of the city portals in

Box 4.6 Madrid: Decide Madrid

Decide Madrid is a virtual participation platform put in place by the city of Madrid in 2015. The platform won a United Nations Public Service Award in 2018 in recognition of its success.

The web platform is complemented by alternative channels that enable sectors of the population affected by the digital divide or other difficulties to have their voices heard.

The initiative is supported by a multidisciplinary team of public employees, including professionals from legal, economic, administrative, social sciences, computer science, and other relevant fields. The team implements and monitors participatory processes, ensures the inclusion of all social sectors, and facilitates the transfer of the platform to other institutions. Multiple municipal entities are collaborating on the development and implementation of the platform, including 26 service offices, the telephone service, and 21 local forums or spaces for face-to-face participation spread across various territories. The municipal service managing the platform has an annual budget of almost €2 million, which covers costs for the following: (a) the production and dissemination of materials such as voting circulars, posters, information brochures, and press and social media content, as well as positioning in social media networks and search engines and relevant monitoring; (b) conference attendance; (c) procedures and processes relating to participation and election activities, such as dynamization by professionals, the generation of mobile information and voting points, and web analytics; and (d) the evaluation of all participatory projects.

The Inclusion, Neutrality and Privacy Service of the General Directorate of Citizen Participation of the City Council of Madrid has been created at the municipal level to ensure that all voices are heard. The Service meets with social organizations and institutions that serve specific groups to identify barriers to the exercise of participation and to propose solutions for improving the accessibility, dissemination and usability of participatory mechanisms and to promote sensitivity to gender issues and the integration of a gender perspective.

This initiative is aligned with the SDG target 11.3.2 objective of enhancing inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management.

Sources: UN DESA; United Nations Public Service Award database (https://publicadministration.un.org/unpsa/database/Home/Winners).

Box 4.7 Bogotá: Bogotá te escucha

Bogotá te escucha (Bogotá listens to you) is a system designed to manage petitions—a virtual tool people can use to submit complaints, claims, requests for information, inquiries, suggestions, concerns about possible acts of corruption, or simple requests relating to issues that affect their own interests or those of the community.

Within the framework of the Zero Tolerance for Corruption strategy, Bogotá te escucha offers all individuals the opportunity to complain about possible acts of corruption. A person can report on irregular events that may be occurring within any district entity in order to activate the investigation and sanction mechanisms. The system offers a registration service but also allows people to file anonymous requests and to check the status of their submissions. The requests can be submitted in person or in writing, by email or by telephone, via the web or regular mail, or through social network channels provided by the Mayor's Office in Bogotá. All requests are addressed to the competent entities so that the district authorities can issue a timely response or initiate an administrative action, as the case may be, ensuring a high rate of satisfaction with the services received.

This initiative is aligned with the SDG target 11.3.2 objective of enhancing inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management.

Sources: Alcaldía Mayor de Bogotá, Servicio a la Ciudadanía (https://bogota.gov.co/sdqs/).

the Americas, 20 per cent (3 of 15 portals assessed) are among those ranked highest. None of the city portals in Africa or Oceania rank high in the technology subgroup.

Madrid, New York, Paris, Seoul and London are the leaders in content provision. Again, Europe has the highest proportion of leading cities as a share of the total number assessed in each region, followed by Oceania, the Americas, Asia and Africa. Among the leaders in content provision are 52 per cent of the city portals assessed in Europe (11 of 21), 50 per cent of the city portals assessed in Oceania (1 of 2), 33 per cent of the city portals assessed in the Americas (5 of 15), 19 per cent of the city portals assessed in Asia (5 of 27), and 5 per cent of the city portals assessed in Africa (1 of 21).

In the services provision category, the city portals of Madrid, New York, Tallinn, Stockholm, Buenos Aires, Dubai and Bogota lead the pack. Among the leaders in services provision, Europe has the largest proportion of city portals as a share of the regional total, with around 62 per cent (13 of 21) of its assessed portals represented, followed by the Americas, with 40 per cent (6 of 15 portals), and Asia, with just under 19 per cent (5 of 27 portals). None of the city portals in Africa or Oceania is on this list.

In the participation and engagement subgroup, Madrid, Paris, Helsinki, Bogota, Moscow, Berlin, Warsaw, Toronto and Lisbon have the highest-ranked city portals. European cities also dominate in

Table 4.2 Leading cities in each LOSI subgroup

Technology		Content provision		Services provision		Participation and engagement	
City	Rank	City	Rank	City	Rank	City	Rank
Tokyo	1	Madrid	1	Madrid	1	Madrid	1
Madrid	2	New York	1	New York	2	Paris	1
New York	2	Paris	1	Tallinn	2	Helsinki	1
Seoul	2	Seoul	1	Stockholm	4	Bogota	4
Shanghai	2	London	1	Buenos Aires	5	Moscow	4
London	2	Stockholm	6	Dubai	6	Berlin	4
Toronto	2	Buenos Aires	6	Bogota	7	Warsaw	4
Kuala Lumpur	2	Berlin	6	Paris	8	Toronto	4
Kabul	2	São Paulo	6	Moscow	8	Lisbon	4
Tallinn	10	Tallinn	10	Shanghai	10	Rome	10
Paris	10	Moscow	10	Rome	10	Istanbul	10
Moscow	10	Bogota	12	Brussels	10	Mexico City	10
Istanbul	10	Shanghai	12	Berlin	13	Seoul	10
Rome	10	Istanbul	12	Istanbul	13	São Paulo	10
São Paulo	10	Toronto	12	Mexico City	15	New York	15
Brussels	10	Rome	16	Warsaw	15	Stockholm	15
Dubai	10	Brussels	16	Helsinki	17	Shanghai	15
Amsterdam	10	Dubai	16	Riyadh	17	Brussels	15
Lisbon	10	Helsinki	16	Seoul	19	London	15
Almaty	10	Prague	16	London	19	Sydney	15
Riyadh	10	Johannesburg	16	Amsterdam	19	Kiev	15
Bangkok	10	Tokyo	16	Athens	19	Tallinn	22
Belgrade	10	Sydney	16	Guayaquil	19		
				Santo Domingo	19		

this category, with around 62 per cent (13 of 21) of the city portals assessed in the region ranked among the leaders. As shown in table 4.2, the list also includes half of the city portals assessed in Oceania (1 of 2), a third of those assessed in the Americas (5 of 15), and around 11 per cent of those assessed in Asia (3 of 27). None of the cities in Africa is on the list.

In table 4.2, a number of cities are highlighted in various colours because they are noteworthy in some way. Madrid occupies the top spot in the 2020 LOSI, having ranked first in content provision, services provision, and participation and engagement and second in the technology category. New York, which ranks second in the 2020 LOSI, ranks among the top three cities in all categories except participation and engagement, in which it ranks fifteenth. Tokyo, which ranks first in the technology subgroup, ranks sixteenth in content provision but does not rank in the top tier for the other two criteria. Seoul and London rank high in content provision, where they are tied for the top spot, and in technology, where both rank second; however, both exhibit much lower performance in the services provision category, where they rank nineteenth, and in the participation and engagement category, where Seoul ranks tenth and London fifteenth. Tallinn is ranked second in services provision and has a relatively high ranking in the technology and content provision categories, but it has a much lower ranking (twenty-second) in participation and engagement. In contrast to Tallinn, Paris ranks tenth in the technology category and eighth in services provision but ranks first in participation and engagement. Bogota, Helsinki and Lisbon have ranking profiles similar to that of Paris; while the three cities do not rank very high in terms of technology and content provision, they are all among the top four in the participation and engagement category.

4.2.3 Challenges and opportunities

Local e-government development provides many opportunities to make cities and human settlements inclusive, safe, resilient and sustainable (SDG 11). However, the digital transformation process and the integration of new technologies in governance structures at the city or municipal level can entail some major challenges and risks.

Inadequate infrastructure and high technology costs

Inadequate ICT infrastructure remains a major obstacle to digital transformation and the development of e-government at the local level.[10] Some cities, especially those in developing countries, are not able to deploy new technologies because they lack the appropriate ICT infrastructure; weak bandwidth and low Internet speed are preventing cities from taking full advantage of frontier technologies. Advanced infrastructure and support systems are required for the instant transfer, analysis and processing of data collected through innovative technologies such as AI, IoT, AV and VR for the efficient management of city operations. With a strong ICT infrastructure and the appropriate hardware and software, local governments would have the tools they need to accelerate e-government development, build smart cities, and solve common urban problems such as air pollution and traffic congestion.

The high costs associated with the deployment and application of new technologies constitute another serious challenge for local governments. For example, introducing VR or AR to promote city tourism is often unfeasible, especially in developing countries, as these technologies are expensive. The lack of financial resources for capital investment in new technologies can be a significant obstacle to the implementation of e-government initiatives. While public budgets cover the costs of local e-government development, there are also costs borne by local residents, who require fixed or mobile broadband Internet subscriptions to be able to take advantage of online public services. Internet affordability is often an issue, especially in low-income developing countries. Where Internet access is expensive and Internet penetration rates are low, fewer people will be able to benefit from

e-services even if they are offered. Other barriers within this context might include the high expense of electronic devices or the lack of a strong Internet signal in more remote areas.

Cloud computing service platforms may offer economies of scale for small and moderately sized cities, which can subscribe to or lease the appropriate services rather than buying the relevant hardware and software; this is especially economical if such services are used in a shared and coordinated manner.[11] Another way to reduce costs and strengthen e-government development (including support for "smart city" projects) is through increased collaboration with the private sector. Local e-government projects can actually stimulate innovation among small and medium-sized enterprises (SMEs). In Tel Aviv, the government has adopted a bottom-up, project-oriented paradigm for its smart city initiative, and the reliance on lean, small-scale projects has made the development process much easier for the city to manage.[12] Steps can also be taken to reduce costs for users. Access to e-services can be facilitated through the use of existing public facilities such as libraries, city halls, educational institutions and kiosks, and Wi-Fi access can be provided or expanded in public spaces such as transport stations, parks and hospitals. More than 260 London Underground (Tube) stations and 79 London Overground stations offer free Wi-Fi in order to provide residents and visitors with the information they need as they move around the city.[13] Transport for London, the government body responsible for the city's public transport system, created the Facebook TravelBot (an AI-powered application) to provide users with immediate information on bus routes, the nearest bus stops, arrival times, maps, and the ability to check continually updated Tube and rail line status reports. TravelBot can refer users to a customer service agent if more detailed information is required.[14]

Local government institutions use a number of tools, including mobile phones and social media networks, to disseminate information and interact with people. Through technology, local governments can disclose useful and timely information (such as council decisions, public finance information, and meeting minutes) in the appropriate format. The adoption of mobile technologies facilitates the transformation of e-government (the provision of online public services) to smart government (leveraging data to make decisions).[15]

Threats to privacy and security

Advanced technology is increasingly being used to collect and analyse data on people's activities and movements. As part of the smart management of cities, for example, sensors and cameras are installed in multiple strategic locations to gather and transmit large volumes of data. The use of facial recognition technology is controversial, as it may be seen as a threat to people's privacy and security. There are ways cities can address such concerns, however. When the Chula Vista Police Department (CVPD) in California introduced its drone programme, special attention was given to addressing people's concerns about their civil liberties and the public's right to privacy in connection with drone operations.[16] Prior to the implementation of the programme, accurate information was disseminated and numerous discussions were held through various media to allow people to express concerns about their personal privacy and provide feedback. After exhaustive discourse and debate, and with assurances that privacy would be protected, the CVPD implemented the programme.

Data security is a key factor in the success and resilience of local e-government. Data can be accessed and exploited by attackers to obtain sensitive public and private information,[17] and city governments can be exposed to the risks of theft, fraud and sabotage. Local governments need to adopt comprehensive, well-integrated regulations, implement solid security and privacy strategies and protocols, and utilize appropriate technical approaches and reliable tools to address the data security and privacy protection issues generated by emerging technologies.

The lack of skilled workers and managing bureaucratic processes

The potential benefits of local e-government can be fully realized only if appropriately skilled workers are available in sufficient numbers. Many municipalities do not have enough capable and qualified employees to manage e-government projects and initiatives or even day-to-day operations. Local governments must make it a priority to strengthen digital literacy and the acquisition of targeted e-skills among existing and potential employees who are essential for e-services provision. This can be achieved through knowledge sharing and cross-training among cities/municipalities, with support from legal and technology experts in the private sector and civil society.

Providing online public services reduces transaction costs and simplifies time-consuming bureaucratic procedures, especially for local governments. Technology applications can streamline interactions between government entities and users, but they can also be used to improve internal e-government operations. San Francisco has introduced a procurement chatbot (PAIGE)[18] for internal use to guide employees through the procurement process, replacing confusion with clear walk-throughs. The digitalization of local government services improves efficiency in many ways but principally by reducing errors and the time spent on repetitive tasks.

The rapid evolution of technology creates the potential for innovative new services. Emerging technology applications such as AI-driven chatbots can help local governments improve service delivery for residents, businesses and visitors and can also be used to streamline internal workforce operations and management. The Rammas chatbot used in Dubai, for example, instantly responds to inquiries from various stakeholders (see box 4.2).

The digital divide

The development and evolution of new technologies may widen the digital divide between cities. Digital divides arise from broad socioeconomic inequalities, and at the root of both are economic and social disparities between countries, groups and individuals that impact their ability to access and use ICT.[19] The first step in bridging digital divides is addressing inequalities. The municipal government in Vienna has carried out more than 60 gender-sensitive projects, making the city a safer and more comfortable place for women by integrating gender mainstreaming into urban project design, often at minimal additional cost. Other gender-sensitive projects implemented by the local government relate to work, education, culture and leisure time.[20]

Many cities in low-income countries have limited resources, weak ICT infrastructure and insufficient skills capacity and are unable to take full advantage of emerging technologies to support their digital transformation initiatives.[21] Isolation is detrimental to digital transformation; local governments that try to deal with the highly complex technological and socioeconomic challenges facing cities all on their own may find it difficult to achieve adequate progress. Partnerships engender more integrated and sustainable solutions that offer local governments the opportunity to improve their cities and satisfy the needs of local residents, so it is critical that collaborative models be developed to facilitate the exchange of knowledge and innovative solutions. The sharing of city initiatives, applications, policies and experiences and the replication of best practices can contribute to the economic and social development of other cities, especially those in developing countries. Seoul's Policy Sharing Initiative is an excellent example of a city's readiness to share knowledge, experience and lessons learned.[22] In Europe, universities in Tallin and Helsinki are working together within the framework of the Talsinki project to build the world's first global centre of excellence focusing on developing top-level research capacities and innovative solutions for cross-border smart cities. One of the key strategies is to exploit local entrepreneurial expertise through the involvement of 30 Estonian-Finnish knowledge-based joint ventures in smart city design and implementation. The joint initiative will

be carried out over a period of seven years, with solutions tested first in Tallinn (starting in 2021) and then in Helsinki, and there are plans to scale the project globally at some point in the future.[23] Tarragona in Spain and Çanakkale in Turkey are involved in another smart city partnership; the two cities exchange governance experience and plan to cooperate on the creation of a smart city platform in Çanakkale following Tarragona's example.[24]

Opportunities for increasing satisfaction and ensuring inclusion

Cities can generate a high level of satisfaction among local residents by offering a wide variety of online services. Providing information, allowing users to apply for official certificates and permits, facilitating the submission of tenders, and accepting electronic payments are only a few of the ways local government can save residents time and resources through effective and efficient public services provision.

Digitalization greatly facilitates two-way interaction and can therefore play a key role in strengthening the relationship between local governments and various stakeholders. The integration of emerging technologies in e-government processes allows city residents to participate in decision-making, the identification of local resources, and other aspects of local governance. Their capacity to contribute to local solutions is exemplified by the Finding Places initiative in Hamburg, which shows how technological innovations can be employed to help solve societal problems such as refugee settlement. With growing access to social media, an increasing number of people are proactively using networking platforms and opportunities to connect with others and engage in participatory decision-making. This expanded access to direct channels of communication will likely contribute to the development of new types of collaborative partnerships between government bodies and local residents.[25] These trends are aligned with the SDG target 16.7 objective of ensuring responsive, inclusive, participatory and representative decision-making at all levels.

Through ICT integration, local governments can improve openness, strengthen transparency, promote accountability and empower people—all of which contribute to building just, peaceful and inclusive societies (SDG 16) and to overall sustainable development. With greater openness and interaction, local governments can develop more responsive policies, improve decision-making, reduce corruption and bribery, better support economic growth, and generate increased trust in government. City governments that create this type of environment can be expected to enjoy a high level of legitimacy among residents.

4.3 Smarter local government

For the most part, ICT has been used by local governments to integrate and streamline internal processes and improve service delivery. However, with the rapid advances in emerging technologies and the changing needs of modern society, local governments may need to rethink and revise—or even revolutionize—services provision and interaction with the public. Local administrations recognize the power of technology and data to transform internal operations, service delivery and interactive mechanisms in ways that contribute to smarter governance. Smart governance models rely on the analysis of massive amounts of data to ensure that all aspects of administration are handled efficiently and effectively and are coordinated within a fully integrated administrative system. For example, such models are capable of integrating all of the political, social and economic aspects of a city and managing the investments and activities required to derive the expected gains.[26] Cities may use emerging technology applications for specific projects, but the contributions of smart services applications to successful, innovative e-government as a whole are mainly in reshaping administrative structures, synthesizing the physical and social aspects of cities for optimal outcomes,

implementing advanced monitoring and control mechanisms to enhance efficiency and quality, and improving infrastructure to support a better quality of life and greater sustainability.[27]

Smart services concepts derive from the transformative and disruptive roles emerging technologies can play in addressing urgent issues affecting modern society. Such technologies, if leveraged appropriately, can be deployed to strengthen the sustainability of local communities against the backdrop of climate change, environmental degradation, austerity politics, population ageing, rampant social inequalities, public safety concerns, rapid urbanization, global migration issues, high unemployment and stagnant economic growth.[28] [29] [30] Cities are increasingly pursuing a holistic, integrated approach to e-government that aspires to satisfy the evolving needs of people and shapes the policy visions of decision makers within the broader sustainable development framework. Smart governance concepts have captured the attention of local, national and supranational entities such as the World Bank, OECD, European Union and private corporations.[31] Millions of people around the globe are currently living in communities in which smart services initiatives have been introduced, though the stage reached in smart city development varies widely. The investment in leveraging emerging technologies for smart city development is expected to expand at a compound annual rate of 16.5 per cent over the next five years, reaching $252.6 billion by 2025.[32]

In most cases, smart services initiatives are the product of interlinked rather than isolated technologies. There are numerous examples of experimentation with combinations of smart technologies that have the potential to contribute to alternative socioenvironmental development approaches at the local government level that may better support the achievement of sustainable development.

Algorithms and AI applications such as machine learning have the potential to help city governments address key challenges associated with huge and fast-growing populations, including issues relating to the water supply, food security, public safety, traffic management, health care, energy requirements, waste management, and the need for inclusive and equitable quality education and lifelong learning opportunities for all. The adoption of such technologies by cities has influenced how they develop plans for and make decisions on building, transportation, organizational and infrastructure projects (see box 4.8).

Box 4.8 Boston: school bus routing optimization

Maintaining a fleet of buses to transport students to and from school is a major expense for school districts. For Boston Public Schools (BPS), busing inefficiency, inconsistency and expense reached crisis levels, with the district registering the highest transportation expenditure in the United States ($2,000 per student per year). In 2017, the school district hosted a competition in which "researchers could experiment with anonymized BPS data sets to create efficient routes and optimal start times for each school". A team from the MIT Operations Research Center created the winning algorithm—Quantum—using Google Maps services to optimize school bus routes. Before the algorithm came along, it took a team of six to eight individuals about four weeks each year to complete the routing plans for approximately 5,000 students, a good number of whom had special needs. The algorithm is now able to do all that in 30 minutes, contributing to inclusive and equitable quality education for the students and promoting lifelong learning opportunities for the employees (SDG 4). The algorithm created a system-wide route map that is 20 per cent more efficient than the manual version. The application of the algorithm allowed the school district to eliminate 50 buses—a substantial 8 per cent reduction. Collectively, the buses drove 1 million fewer miles during the 2017/18 school year, and carbon dioxide emissions were reduced by 20,000 pounds per day.

Sources: Emma Coleman, "How one city saved $5 million by routing school buses with an algorithm, Route Fifty, 12 August 2019, available at https://www.routefifty.com/tech-data/2019/08/boston-school-bus-routes/159113/.

One of the biggest challenges for modern cities is addressing the excessive generation of solid waste and ensuring its environmentally safe disposal. The increase in solid waste, particularly household waste, coupled with inadequate management and the lack of disposal capacity, has become a global concern. Through the adoption of AI for smart recycling and waste management, sustainable waste management systems can be developed to improve the transportation, handling, disposal and recycling of waste (see box 4.9). Such initiatives are aligned with the SDG 6 objective of ensuring availability and sustainable management of water and sanitation for all.

Box 4.9 São Paulo: effective waste management

It is now mandatory for all companies headquartered in São Paulo to register with Electronic Waste Transport Control (CTR-E), the city's new technology-driven garbage collection system. CTR-E was created to monitor and track all private stakeholders that are part of the urban cleaning system—those disposing of, transporting, handling or recycling solid waste or dealing with final-destination arrangements—as well as the equipment, containers and facilities used for waste management.

Companies must complete an electronic form to declare how much waste they generate and who they use to transport and dispose of it. Private service providers (even micro-entrepreneurs) must also register with the system. The city uses technology (smart phone apps, specialized software, and QR codes on containers, dumpsters and trucks) to identify and track the sources, volume, movement and final destination of solid waste. The detailed monitoring data obtained through the system allows municipal authorities to streamline operations and optimize waste treatment solutions, in part through increased reuse and recycling.

Private waste transporters also benefit from the system, which facilitates efficient customer management through effective monitoring and control of the geolocation of their equipment and of all waste transportation vehicles authorized to travel on public roads. Because large waste generators are now obligated to make their own arrangements for waste transport, treatment and disposal, the number of private waste management entities applying for official licensure has skyrocketed.

Prior to the system's implementation, only 16,000 companies had informed the municipality of how they were disposing of their waste, and only 80 transporters were officially authorized to collect waste in the city. With the introduction of CTR-E, the number of business registrations rose sharply; CTR-E has already processed more than 438,000 registrations, including companies, equipment and carriers. More than 25,000 waste containers in the municipality are registered and are now geolocatable so that action can be taken when and where needed. These measures are keeping exposed garbage bags off the streets and are thus helping to prevent flooding and rodent infestation.

Sources: Chicko Sousa, "Track your trash: how São Paulo is reducing waste with technology", World Economic Forum, 30 September 2019, available at https://www.weforum.org/agenda/2019/09/the-benefits-of-digitizing-waste-management/.

Blockchain is opening up a wide range of possibilities for smart services applications. The transformative potential of this technology is enormous. Public officials are investigating how blockchain systems can assist them in their administrative duties and are exploring ways the blockchain ecosystem can benefit society at large. Blockchain technology will allow certain aspects of city management to be distributed among stakeholders, decentralizing governance and making it possible for complex transactions to be managed by multiple parties in areas such as power production, distribution and consumption.

Cities can use analytics to improve municipal policymaking and operations in a wide range of areas (see boxes 4.9 and 4.10). Big data is produced from a variety of sources and is becoming critically important in the design and deployment of effective local government policies. Decision-making based on comprehensive real-time city data analysis allows municipal authorities to optimize public

resources in a holistic manner. Leveraging the full potential of big data can transform government models, service models and industrial development processes, making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11).

Box 4.10 Hangzhou: real-time traffic management

Hangzhou manages its traffic through the analysis of big data. Millions of servers clustered together in a supercomputer analyse data points and use proprietary algorithms to manage traffic signals and improve traffic flows. Using analytics and artificial intelligence, the city's smart traffic system has helped reduce congestion, road accidents and crime.

Cameras across the city monitor traffic conditions at all times. The traffic management system recognizes traffic accidents and congestion from video footage and integrates Internet data and alarm data to instantly perceive and respond to traffic incidents throughout the city. When an accident occurs, road users and authorities are quickly alerted and traffic flows are managed accordingly. Using smart vehicle dispatching technology, the system issues integrated dispatch commands to police, fire, rescue and other essential vehicles. The system then coordinates traffic lights to give emergency response vehicles unimpeded access to emergency sites.

Video analysis technology is used to index the entire city, and video recognition algorithms allow authorities to take preventive measures to ensure the safety and security of the public. The use of the traffic management system has increased traffic speeds by 11 per cent and has reduced travel time in the city by 10 per cent.

Sources: Du Yifei, "Hangzhou growing 'smarter' thanks to AI technology", first published in *People's Daily*, 19 October 2017; accessed from the Al Wihda website, available at https://www.alwihdainfo.com/Hangzhou-growing-smarter-thanks-to-AI-technology_a58657.html.

Big data and analytics can play a key role in the achievement of SDG 9 (building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation) and SDG 11 (making cities and human settlements inclusive, safe, resilient and sustainable). These technologies have the capacity to transform the management of public services such as road maintenance, waste management, lighting, the irrigation of green spaces, and many other essential functions that require logistical coordination. Using real-time updates from a wide range of sources allows local authorities to respond to societal needs more quickly and efficiently. The local government in Madrid,[33] for example, is heavily invested in the use of data to improve the quality and efficiency of city services and to inform the development and deployment of new tools for enhanced interaction and communication between residents and municipal offices.

Support for the use of IoT in public services provision is gaining serious traction. The feedback mechanisms built into IoT applications make this technology ideal for smart health-care systems, smart transportation projects, law enforcement, emergency situations, road and water management, air pollution monitoring, and the management of forests and farmlands (including the monitoring of soil erosion and degradation).[34]

Immersive technologies such as AR and VR can provide users with engaging experiences and in the present context can improve municipal governance and the lives of visitors and local residents. These technologies are often mentioned in the context of promoting local tourism, as they can play an important role in attracting visitors, which bolsters the economy. However, there are also a number of practical uses for AR and VR in municipal operations. Large metropolitan areas are often difficult to navigate, even for local residents, and using a traditional smartphone GPS is not always the safest approach, as it interferes with the user's awareness of his or her surroundings and can lead to an accident. Creating an augmented layer with navigation can drastically improve the navigation experience and increase the safety of the driver. In emergency situations or in the aftermath of a disaster, AR applications can provide rescuers with virtual assistance, including clear communication

channels, accurate information on current conditions, safe-route suggestions, and real-time decision-making support.[35] AR and VR can also be used to train police officers and rescue workers, as the interactive visual effects can allow them to experience and respond to simulated threats in realistic locations and threat situations. These emerging technologies, like the others reviewed in this section, can contribute to the SDG 11 objective of making cities and human settlements inclusive, safe, resilient and sustainable.

Global migration and refugee crises constitute an urgent challenge for many cities. Sociopolitical developments can prompt large-scale migration, and cities in the destination countries are often tasked with accommodating substantial numbers of refugees and asylum-seekers. The adoption of collaborative decision-making systems for refugee accommodation can help local governments make well-informed decisions that best serve their particular communities. Such systems may be based on different combinations of traditional e-government approaches and those driven by innovative technologies. Solutions that are tailored to individual settings support the achievement of SDGs 8, 10, 11 and 16 by reducing inequalities, making cities inclusive and resilient, and advocating peaceful and sustainable communities. Hamburg has dealt with the challenge of accommodating refugees by employing a bottom-up, community-driven decision-making approach. A systematic solution has been adopted that centres around the equal distribution of refugees within the city so that they are not concentrated in any one area. Efforts in this regard are supported by technology applications in areas such as urban planning, architecture, real estate development, data analysis, logistics and human dynamics, which ensure that a systematic approach is being taken to address both resident and refugee needs and to facilitate communication and engagement so that tensions do not arise over perceived inequalities or unmet needs.[36]

Existing city infrastructure can be improved through increased reliance on cloud computing, which offers local governments the opportunity to seamlessly implement new smart applications to improve data capture, strengthen predictive capacities, and enhance services provision—while also keeping costs down.[37] The local authorities in Buenos Aires are using a cloud-based system to manage the city's smart lighting system (see box 4.11), ensuring access to affordable, reliable, sustainable and modern energy for all (SDG 7) and sustainable consumption and production patterns (SDG 12). Cloud computing options are also available for residents, who can conveniently use cloud services virtually anywhere on the device of their choice.

Box 4.11 Buenos Aires: cloud-based lighting management system

As the population of Buenos Aires has increased, so have energy consumption and CO^2 emissions. In an effort to rationalize energy use, local authorities installed a high-quality LED street lighting system supported by cloud-based lighting management software. The new system is more energy efficient, cheaper to operate and more sustainable and has made the city safer and smarter. The system allows the monitoring, switching, and dimming of each light point in the network, optimizing energy consumption and creating safe conditions for vehicles and pedestrians. The lighting management software supports new and existing lighting assets and the remote monitoring of performance, energy consumption and fault detection. The system upgrade has affected 91,000 light points or 75 per cent of the city lighting in Buenos Aires, saving 50 per cent in operational costs and significantly reducing annual CO^2 emissions.

Sources: Interact City, "Buenos Aires: an innovative platform that supports adaptive smart city applications, available at https://www.interact-lighting.com/global/customer-stories/buenos-aires.

As part of the broader effort to build effective, accountable and inclusive institutions at all levels (SDG 16), local governments can outsource various functions and save themselves and users both time and money. By using commercial platforms created by established service providers, local authorities avoid

having to invest in expensive hardware and software, and residents have easy access to services. The Guangdong Province in China has a population of more than 110 million, and the government has set it up so that residents can use a social networking app for 142 local government functions and services, allowing them to avoid the long lines at government offices.

4.4 Summary and conclusions

The following summary and conclusions draw from the results of the 2020 LOSI survey and the case studies presented in this chapter:

- The findings of the 2020 LOSI survey reinforce those of the 2018 survey in affirming that local government portals generally do not perform as well as the national portals in the countries in which the cities are located. This underlines the continuing need for separate assessments of e-government development at the local and national levels.
- The average LOSI value for the cities assessed in the current study is 0.43, which indicates that the majority of the city portals have a long way to go to realize their full potential. Comparisons between city portals and national portals further support this view; as noted above, most of the national portals are far more advanced than those operating at the local level.
- There appears to be a positive correlation between the LOSI level of a city and the income group of the country in which the city is located; in other words, cities in low-income countries tend to rank relatively low in the Local Online Service Index. However, there is enough divergence to suggest that financial resources are not the only crucial factor; there are a number of cities in high-income countries with middle LOSI values and some cities in upper-middle-income countries with very high LOSI values.
- As a group, the city portals assessed in the 2020 LOSI survey performed best in the content provision category, with the majority of cities having met most of the relevant indicators. Consistent with the 2018 LOSI findings, the results of the 2020 LOSI study indicate that cities are committed to offering adequate content and improving the usability of their websites but are not focusing as much on providing e-services and boosting participation.
- The lowest rate of compliance is in the services provision category, with only 7 per cent of the city portals assessed having implemented 75 to 100 per cent of the 25 services listed. A majority of the city portals reviewed do not meet common (WCAG and W3C) technology standards and guidelines. However, cities are making an effort to improve accessibility; the survey results show that nearly all of the city portals are accessible via mobile devices, which points to the increased dissemination of mobile technologies and their widespread integration in e-government systems.
- Most of the city portals assessed rely heavily on social media networks such as Facebook, Twitter, YouTube and Flickr to connect with the general public. Very few portals incorporate traditional participation tools - such as e-polls, e-forums, chat rooms, blogs, e-petitions, or other tools - for direct interaction. There may be a number of reasons for this, but it is most likely because, comparatively, social media is low-cost, more familiar and easier to use.
- The study findings point to the need for a shared vision of local e-government and increased collaboration on relevant development projects. All stakeholders—including local residents, the private sector, the government, non-governmental organizations and international organizations—should help guide the evolution of e-government for the good of all.
- New technologies have enormous potential for improving public services delivery, but ultimately they are just a means to an end. As with national e-government initiatives, local e-government development needs to be people-driven rather than technology-driven. The top priorities for local government authorities should be bringing people online and increasing their satisfaction. Governments can facilitate access to e-services by ensuring that Wi-Fi services (and in some cases Wi-Fi-enabled devices) are available at existing public venues such as libraries, city halls, educational institutions, and kiosks, and Wi-Fi access can be provided in public spaces such as

transport stations, parks and hospitals. In order to fulfil people's expectations, local governments need to understand their priorities and concerns and involve them in governance. This can be achieved by conducting awareness campaigns and highlighting the important role people play as equal partners in local government rather than mere consumers of e-services. Most importantly, local e-government initiatives—particularly those integrating new technologies—must be designed to benefit everyone and leave no one behind, especially women, youth, persons with disabilities, refugees, visitors, lower-income groups, and other underserved populations.

- SMEs should be incentivized to develop innovative ideas and initiatives for local e-government development. Local enterprises have an important stake in the success of their communities and have the potential to become critical partners in developing and delivering smart city solutions.
- There is a need to support more collaboration among cities, especially in leveraging new technologies for smart city initiatives. Cities that have successfully implemented smart services projects can share what they have learned with cities that are still searching for the right solutions.

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6 The 14 cities with no e-government portals at the time the assessment was undertaken include eleven cities in Africa (Kinshasa, Democratic Republic of Congo; Conakry, Guinea; Bamako, Mali; Matola, Mozambique; Niamey, Niger; Dakar, Senegal; Khartoum, Sudan; Juba, South Sudan; N'Djaména, Chad; Mogadishu, Somalia; and Yaoundé, Cameroon), two cities in Asia (Pyongyang, Democratic People's Republic of Korea; and Sana'a, Yemen), and one city in the Americas (Port-au-Prince, Haiti).

7 The range of OSI group values for each level are mathematically defined as follows: very high OSI values range from 0.75 to 1.00 inclusive, high OSI group values range from 0.50 to 0.7499 inclusive, middle OSI values range from 0.25 to 0.4999 inclusive, and low OSI values range from 0.0 to 0.2499 inclusive. In all references to these ranges in text and graphic elements, the respective values are rounded for clarity and are expressed as follows: 0.75 to 1.00, 0.50 to 0.75, 0.25 to 0.50, and 0.00 to 0.25.

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5. E-participation

5.1 Introduction

Participation is a key dimension of governance and is one of the pillars of sustainable development, as underscored in Agenda 21, the outcome of the United Nations Conference on Environment and Development (the Earth Summit), in 1992. The 2030 Agenda for Sustainable Development also highlights the importance of national participatory processes, particularly in Sustainable Development Goal (SDG) target 16.7, which calls for ensuring responsive, inclusive, participatory and representative decision-making at all levels.[1]

The concept of e-participation revolves around the use of information and communications technology (ICT) to engage people in public decision-making, administration and service delivery; hence, e-participation is usually considered part of e-government. The definition used by the United Nations in the E-Government Survey is "the process of engaging citizens through ICT in policy, decision-making, and service design and delivery in order to make it participatory, inclusive, and deliberative".[2] An influential early paper characterized e-participation "as a social activity, mediated by ICT, involving interaction between citizens, public administration and politicians".[3] This definition highlights the vital importance of the triangle of citizens, public administration and politicians as key stakeholders in e-participation initiatives.

As a subfield of participation, e-participation is seen to have both intrinsic and instrumental value. Its intrinsic value is based on the idea that participation (online or offline) is a desirable goal because it contributes to inclusive societies both directly and through increased civic engagement. The instrumental value of e-participation derives from the role it can play in increasing government accountability, making public services more responsive to people's needs, and improving the quality of policies and legislation. Broader goals include strengthening the legitimacy of Governments and people's trust in public institutions. In addition, e-participation is analysed from a technology perspective as a way to enhance digital governance and move towards digital societies.

By definition, e-participation is a subset of both participation and e-government. It is also connected to several other dimensions of governance and public administration, and those relationships are explored in the sections below. A simplified conceptual map illustrating some of the intersections is shown in figure 5.1.

Over the years, the scope of e-government has broadened beyond the delivery of public services; this is reflected in the semantic shift from e-government to "digital government" and "digital governance" and the growing emphasis on the role ICT plays in public administration.

Photo credit: Infographic by DPIDG

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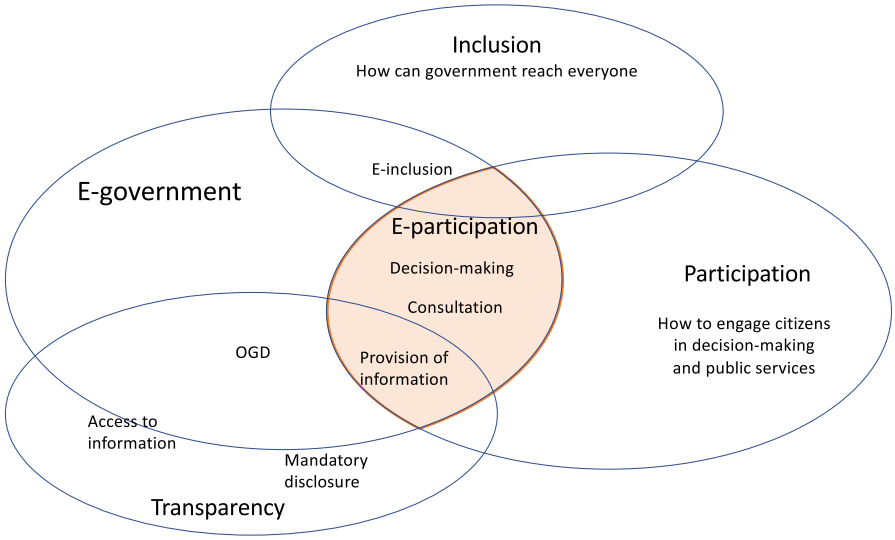
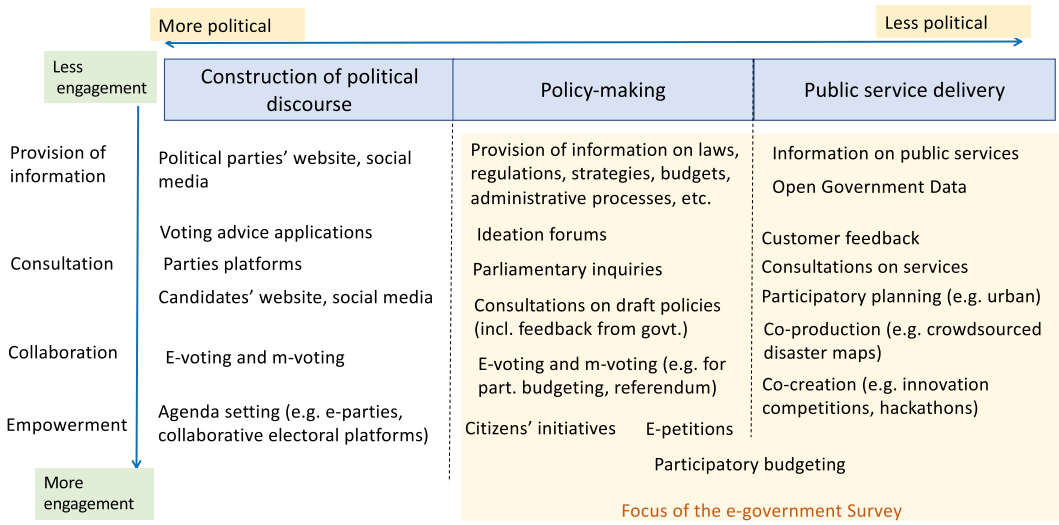
Figure 5.1 The relationship between e-participation and other dimensions of governance



Note: The figure represents e-participation as the intersection of participation and e-government. It highlights the three aspects of e-participation prioritized in the United Nations E-Government Survey: the provision of information, consultation, and decision-making. Transparency intersects with e-participation around the provision of information, including through open government data (OGD). Inclusion intersects with e-participation as well, especially in relation to consultation and decision-making.

Figure 5.2 The e-participation spectrum based on the political dimension and level of engagement, with examples of associated tools



Note: The elements in the figure are not aligned to reflect the fact that their position along the vertical scale (level of engagement) can vary depending on the details of their design. The same applies to the horizontal scale; for example, participatory budgeting has aspects of both decision-making and public service delivery.

There is a large volume of literature relating to "e-democracy", defined as "the use of ICT to support the democratic decision-making processes."[4] That literature focuses largely on civic participation in the construction of political discourse and the engagement of citizens in direct participation (as opposed to participation through representatives). Between the two, the realm of policymaking is usually considered part of e-government and is included in studies of e-democracy and e-participation. For conceptual clarity, therefore, it is convenient to distinguish a continuum that goes from construction of the political discourse and engagement of citizens in political agendas to policymaking and to the design and delivery of public services. It is difficult to define precise boundaries between these

categories; however, the associated e-participation mechanisms vary depending on where in the continuum one looks (see figure 5.2). Governments across the world place varying emphasis on the three categories, which has implications for the understanding of the potential and limitations of e-participation initiatives (see section 5.3). The scope of the analysis of e-participation in the present E-Government Survey includes policymaking and the delivery of public services; it does not cover public participatory aspects of the construction of the social and political discourse, which are considered part of e-democracy.

Since 2001, the United Nations E-Government Survey has tracked developments in e-participation as reflected in the features of national e-government portals and the websites of government departments. The Survey is the only global instrument to do so at regular intervals and is therefore a useful resource for analysing e-participation trends over time. However, the Survey's methodology is such that it mainly captures what may be called the "supply" side of e-participation (the opportunities Governments put in place for individuals to engage electronically); the "demand" side of e-participation is not well captured by the Survey (see box 5.1).

Box 5.1 The scope of the United Nations E-government Survey and implications for the analysis of e-participation

Since 2001, the United Nations E-Government Survey has tracked developments in e-government in all Member States. The Survey is a well-recognized global source of data on e-government. The methodology of the Survey involves the inspection of national government portals and government department websites. It focuses on the government provision of electronic services, information, and opportunities for consultation on and engagement in policymaking and service delivery at the national (whole-of-government) and sectoral levels. The assessed features of government portals and websites relate more to the provision of information than to citizen consultation, and more to citizen consultation than to citizen involvement in decision-making, which is relatively difficult to characterize.

The Survey provides information on the supply side of e-participation (opportunities offered by the Government) but does not measure the demand side (the uptake of opportunities and the quality of e-participation). Other areas not assessed by the Survey include the outcomes of e-participation (including its impact on the quality of policies and decisions and on the quality of public services); the costs and benefits of e-participation; and the "e-democracy" aspect of e-participation (including initiatives aimed at involving citizens in the construction of political discourse).

The Survey focuses mainly on the development of e-participation at the national level, even though a large portion of the innovations in e-participation have originated at the subnational level. Examples of e-participation at the local level are provided in chapter 4 of the present Survey.

This chapter assesses the quantitative trends revealed in the 2020 Survey, focusing on the changes over time and on the differences between countries and across world regions. The analysis of Survey data is complemented by qualitative insights coming from a review of the literature as well as cases and initiatives highlighted by Governments in their Survey inputs. The chapter concludes with recommendations for policymakers.

5.2 Major trends in e-participation as captured by the 2020 E-Government Survey

While specific distinctions may be debated, experts agree that there are several degrees of participation. Since its inception, the United Nations E-Government Survey has utilized a three-point scale that distinguishes between the provision of information (whereby the government provides information to people), consultation (whereby the government consults individuals on policy or on

service delivery at different stages of the process and possibly provides feedback to them), and decision-making (whereby the government involves people in decision-making).[5]

The Survey assesses e-participation on the basis of the features of national e-government portals that relate to these three categories (see box 5.2). An E-Participation Index (EPI) value is calculated for every country by adding the values for each of the selected features and dividing the total by the maximum possible value for normalization (see the methodology annex). The features included in the EPI have varied over time as the Survey questionnaire has evolved.

Box 5.2 Summary of the e-participation features assessed by the 2020 E-Government Survey

- Availability of online information (on policies and budgets) in the areas of education, health, social protection, employment, environment and justice.
- Use of digital channels (including mobile devices/platforms) and open data technologies in the areas of education, health, social protection, employment, environment and justice.
- Availability of online information on people's right to access government information (such as legislative acts guaranteeing freedom of information and access to information).
- Availability of personal data protection legislation online.
- Availability of e-participation policies/mission statements online.
- Availability of public procurement notifications and tender results online.
- Evidence of government partnerships or collaboration with third parties (such as civil society or the private sector) in the provision of services.
- Evidence of free access to online government services through the main portal, kiosks, community centres, post offices, libraries, public spaces or free Wi-Fi.
- Availability of open data sets (in machine-readable, non-proprietary formats) and related policies and guidance online.
- Evidence of opportunities for the public to propose new open data sets to be made available online.
- Availability of online tools (on the national portal) to invite and obtain public opinion and other input in raw (non-deliberative) form.
- Evidence of the engagement of individuals in consultations/communication relating to education, health, social protection, employment, environment and/or justice.
- Evidence of the connection between government decisions made and the results of online consultations with the public on issues relating to education, health, social protection, employment, environment and/or justice.
- Evidence of Governments' publication of outcomes of policy consultations online.

5.2.1 E-Participation Index: country groupings

Since 2016, the countries assessed have been assigned to one of four EPI levels or groups based on their respective EPI values. Countries in the low EPI group have EPI values of between 0.0 and 0.25, those in the middle EPI group have values in the 0.25-0.50 range, countries in the high EPI group have values of 0.50 to 0.75, and those in the very high EPI group have values of 0.75 to 1.00.[6] The EPI group classifications for 2020 are presented in table 5.1.

Table 5.1 Countries grouped by E-Participation Index level

Very high EPI level (0.75 to 1.00)	High EPI level (0.50 to 0.75)	Middle EPI level (0.25 to 0.50)	Low EPI level (0.0 to 0.25)
Albania	Andorra	Afghanistan	Algeria
Argentina (+)	Azerbaijan	Angola	Central African Republic (-)
Armenia (+)	Bahamas	Antigua and Barbuda	Comoros
Australia	Bangladesh (-)	Belize	Democratic People's Republic of Korea
Austria	Barbados	Botswana (+)	Democratic Republic of the Congo
Bahrain	Belgium (-)	Burundi	Djibouti
Belarus	Benin (+)	Cabo Verde	Equatorial Guinea
Brazil	Bhutan	Cambodia (+)	Eritrea
Bulgaria	Bolivia (Plurinational State of)	Cameroon	Gambia (Republic of the) (-)
Canada	Bosnia and Herzegovina (+)	Chad (+)	Guinea-Bissau
Chile	Brunei Darussalam	Congo (+)	Haiti (-)
China	Burkina Faso	Côte d'Ivoire (+)	Lao People's Democratic Republic
Colombia	Costa Rica (-)	Cuba	Liberia (-)
Croatia	Czech Republic	Dominica (-)	Libya
Cyprus	Egypt	Eswatini	Mauritania
Denmark	El Salvador	Ethiopia (-)	Nauru
Dominican Republic (+)	Georgia	Fiji	Papua New Guinea
Ecuador (+)	Ghana	Gabon (+)	Sao Tome and Principe
Estonia	Guatemala	Grenada	South Sudan
Finland	Hungary	Guinea	Sudan
France	Israel (-)	Guyana	Turkmenistan
Germany	Kenya	Honduras (-)	Venezuela (Bolivarian Republic of) (-)
Greece	Kiribati (+)	Iran (Islamic Republic of) (-)	
Iceland (+)	Kyrgyzstan	Iraq	
India	Latvia	Jamaica	
Indonesia (+)	Liechtenstein	Jordan	
Ireland	Lithuania (-)	Lebanon	
Italy	Luxembourg (-)	Lesotho (+)	
Japan	Mauritius	Madagascar	
Kazakhstan	Mongolia	Malawi (+)	
Kuwait (+)	Montenegro	Maldives	
Malaysia	Morocco (-)	Mali (+)	
Malta	Mozambique (+)	Marshall Islands (+)	
Mexico	Namibia (+)	Micronesia (Federated States of) (+)	
Netherlands	Nicaragua (+)	Monaco (-)	
New Zealand	Pakistan	Myanmar (+)	
North Macedonia (+)	Panama	Nepal (- -)	
Norway	Qatar	Niger (+)	
Oman	Rwanda (-)	Nigeria	
Paraguay (+)	Saudi Arabia	Palau	

Source: 2020 United Nations E-Government Survey.

Note: Countries with a (+) moved up one EPI level between 2018 and 2020 (for example, from the low to the middle EPI group). Countries with a (-) or (- -) moved down one or two levels, respectively, during this period.

Table 5.1 Countries grouped by E-Participation Index level

Very high EPI level (0.75 to 1.00)	High EPI level (0.50 to 0.75)	Middle EPI level (0.25 to 0.50)	Low EPI level (0.0 to 0.25)
Peru	Seychelles	Saint Kitts and Nevis (-)	
Philippines	Slovakia (-)	Saint Lucia (+)	
Poland	Sri Lanka	Saint Vincent and the Grenadines (-)	
Portugal	Syrian Arab Republic (+)	Samoa	
Republic of Korea	Togo	San Marino	
Republic of Moldova	Trinidad and Tobago	Senegal (-)	
Romania (+)	Tunisia (-)	Sierra Leone	
Russian Federation	Uganda	Solomon Islands (+)	
Serbia	United Republic of Tanzania	Somalia (+)	
Singapore	Viet Nam	Suriname (+)	
Slovenia		Tajikistan	
South Africa		Timor-Leste	
Spain		Tonga	
Sweden		Tuvalu (+)	
Switzerland		Vanuatu	
Thailand (+)		Yemen (+)	
Turkey		Zambia	
Ukraine (+)		Zimbabwe	
United Arab Emirates			
United Kingdom of Great Britain and Northern Ireland			
United States of America			
Uruguay			
Uzbekistan			

Source: 2020 United Nations E-Government Survey.

Note: Countries with a (+) moved up one EPI level between 2018 and 2020 (for example, from the low to the middle EPI group). Countries with a (-) or (- -) moved down one or two levels, respectively, during this period.

Table 5.2 Countries ranked highest in the 2020 E-Participation Index

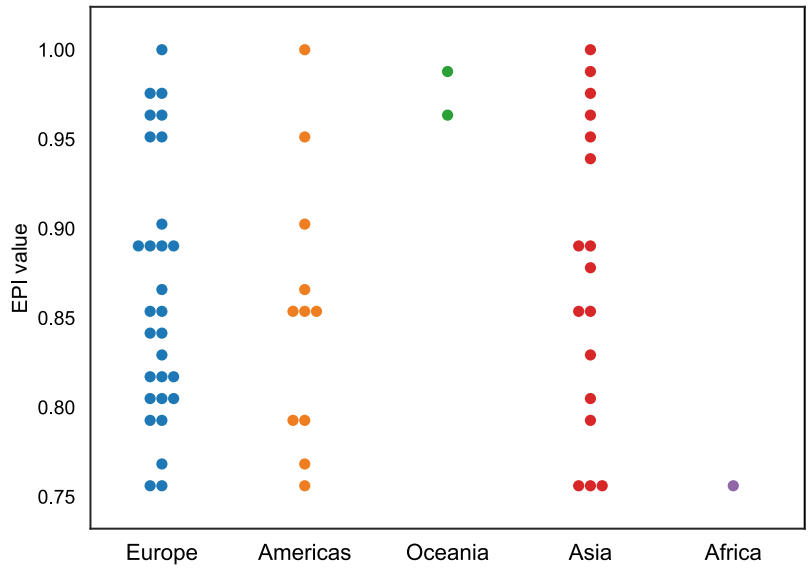
EPI rank in 2020	Country	EPI value in 2020	EPI rank in 2018	Change in EPI rank from 2018 to 2020
1	Estonia	1.000	27	+26
1	Republic of Korea	1.000	1	0
1	United States of America	1.000	5	+4
4	Japan	0.988	5	+1
4	New Zealand	0.988	5	+1
6	Austria	0.976	45	+39
6	Singapore	0.976	13	+7
6	United Kingdom of Great Britain and Northern Ireland	0.976	5	-1

Source: 2020 United Nations E-Government Survey.

The eight countries ranked highest in the 2020 EPI are listed in table 5.2. Estonia, the Republic of Korea and the United States of America each have an EPI value of 1.0, which means that all of the e-participation features assessed in the Survey are present in these countries. Japan and New Zealand are both ranked fourth, and Austria, Singapore, and the United Kingdom of Great Britain and Northern Ireland are ranked sixth. Five of the eight countries listed in the table were ranked among the top 10 in the 2018 EPI.

About half of the 63 countries in the very high EPI group are in Europe, 17 are in Asia, and 11 are in the Americas. In Oceania, only New Zealand and Australia are in this category. South Africa, with a value of 0.75, is the only African country in this group (see figure 5.3).

Figure 5.3 Global distribution of the 63 countries in the very high E-Participation Index group, by region

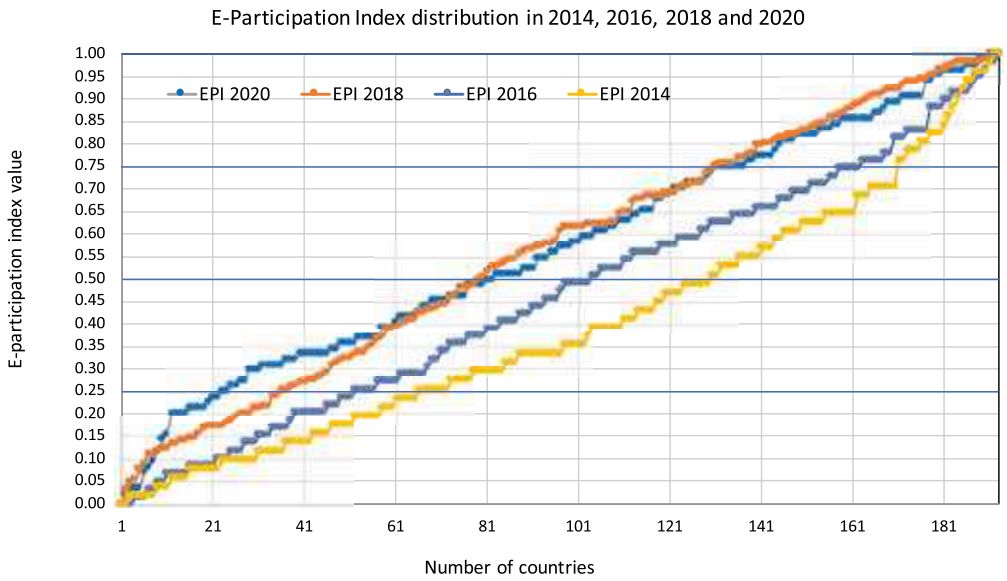


Source: 2020 United Nations E-Government Survey.

Because the EPI is constructed independently for each Survey, the movement of countries from one EPI grouping to another over time cannot be interpreted as straightforward progress or regression. However, because the EPI is based on a simple additive scale, the distribution of EPI values across countries, and to some degree across time, can be analysed to identify important trends.

Figure 5.4 illustrates the changes in the EPI distribution since the 2014 E-Government Survey. The 2014 Index distribution reflects a relatively small group of countries (22) with advanced functionalities for e-participation (EPI values above 0.75) and many countries with limited development in this area; 65 countries had EPI values below 0.25, and 130 countries had EPI values below 0.50. Between 2014 and 2016, and again between 2016 and 2018, the number of countries with EPI values below a given level continued to decrease. Between 2018 and 2020 there was little change in the distribution, except at the bottom, which became more skewed. The 2020 results show only a small number of countries offering extremely limited e-participation features (10 countries with EPI values below 0.15 and 22 with EPI values below 0.25) and a large number of countries at the top of the distribution offering many of the features assessed in the Survey.

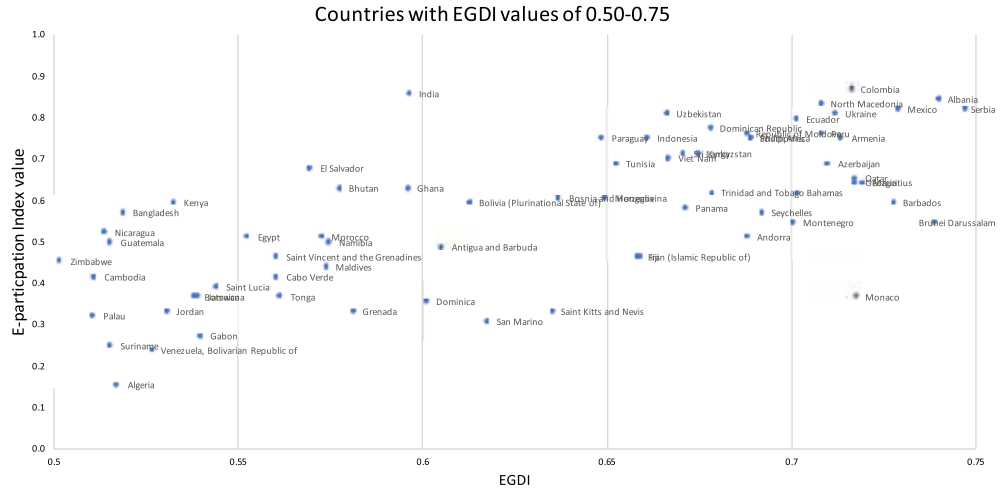
Figure 5.4 E-Participation Index distribution for the four most recent E-Government Surveys



Source: 2014, 2016, 2018 and 2020 United Nations E-Government Surveys.

Note: The graph is read as follows: in 2014 (yellow line), 65 countries had EPI values below 0.25.

Figure 5.5 E-Government Development Index and E-Participation Index values for countries in the high EGDI group in 2020



Source: 2020 United Nations E-Government Survey.

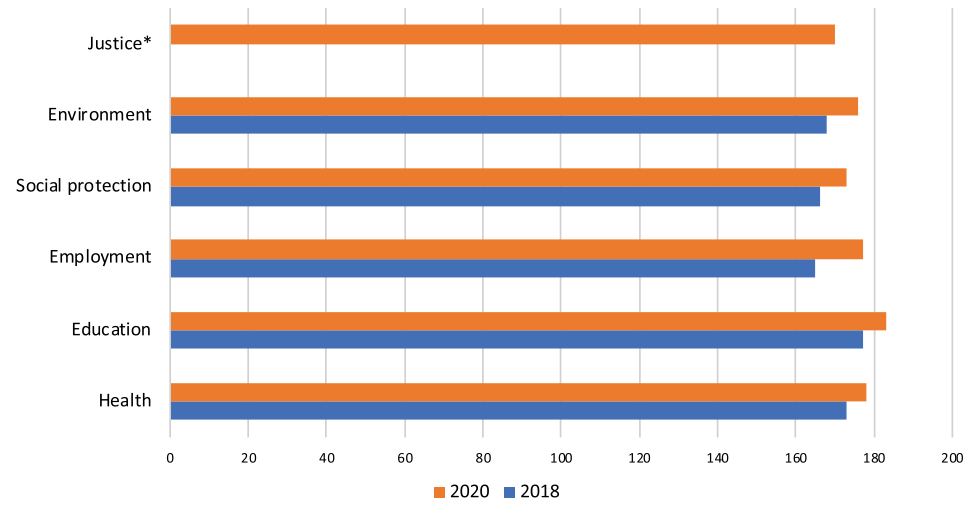
In general, the EPI level as calculated by the Survey is closely correlated with the overall level of e-government development in a country (see chapters 1 and 2). This is due in no small part to the methodology of the Survey, which focuses on the content of national e-government portals and government department websites. Nonetheless, there can be significant differences across countries at the same level of e-government development in terms of the e-participation features they offer. This suggests that efforts to develop e-government can be more or less oriented towards participation. Figure 5.5 illustrates this point for the countries in the high EPI group in 2020 (those with EPI values between 0.50 and 0.75). As an example, India is at a higher EPI level than its EGDI level would suggest. Conversely, many small countries are at EPI levels that are lower than their respective

EGDI levels. In the case of small island developing States (SIDS), this may reflect technology barriers or resource constraints that affect the Government's ability to develop e-participation mechanisms. Other factors may play a role as well (see section 5.3 below).

5.2.2 Trends relating to specific features of e-participation

This subsection highlights some of the e-participation features found on national e-government portals and government department websites. One feature the Survey has consistently assessed over time is the provision of information relating to specific sectors; the 2020 Survey covers the health, education, employment, social protection, environment and justice sectors. Past Surveys showed a rapid increase in the number of countries publishing sectoral information on relevant websites, and by 2018 a vast majority of countries were doing so. The 2020 Survey confirms that the publication of sectoral information is almost universal; more than 170 countries have published some kind of information for each of the sectors assessed, and there have been only marginal increases between 2018 and 2020 in the number of countries that have done so for the sectors covered in both Surveys (see figure 5.6).[7] Only 7 of the 193 countries surveyed were found not to have published information on any of the six sectors considered. Hence, as of 2020, it seems fair to say that the publication of sectoral information online is no longer a discriminant feature in the analysis of progress in e-government development.

Figure 5.6 Number of countries offering archived online information, by sector, 2018 and 2020



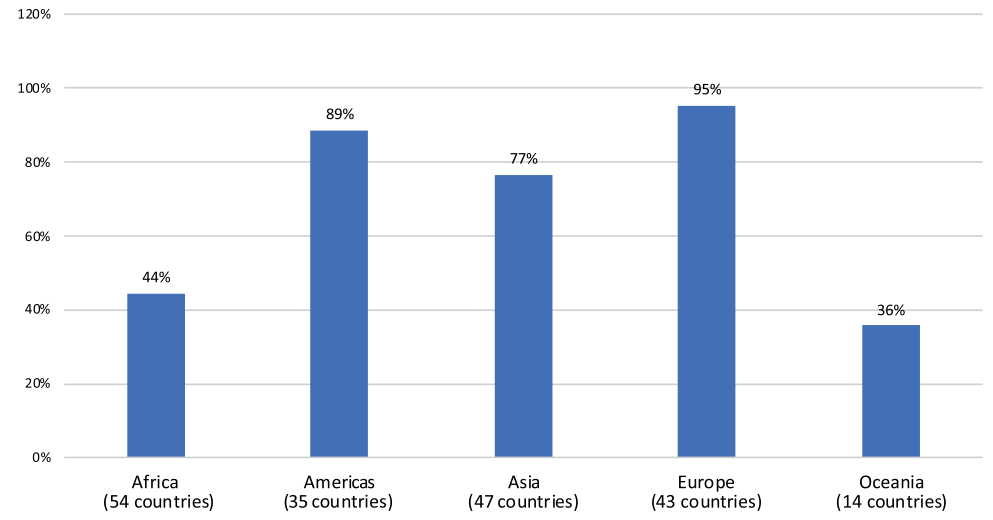
Source: 2018 and 2020 United Nations E-Government Surveys.

Note: As the justice sector component was added in 2020, no comparative data are available for 2018.

A similar upward trend is observed for the provision of online information on the right of individuals to access government information, as reflected in freedom of information acts, access to information acts, or similar legislation. The number of countries that include such information on their public portals or websites increased from 105 in 2016 to 132 in 2018 and to 137 in 2020. There are marked differences between regions, however; fewer than half of the countries in Africa and Oceania provide such information, compared with 95 per cent (41 of 43) of the countries in Europe (see figure 5.7).

Many Governments now offer opportunities for e-participation that go beyond the provision of information. Such opportunities grew rapidly between 2012 and 2018, as illustrated in the successive editions of the Survey, which included an assessment of interaction mechanisms incorporated in

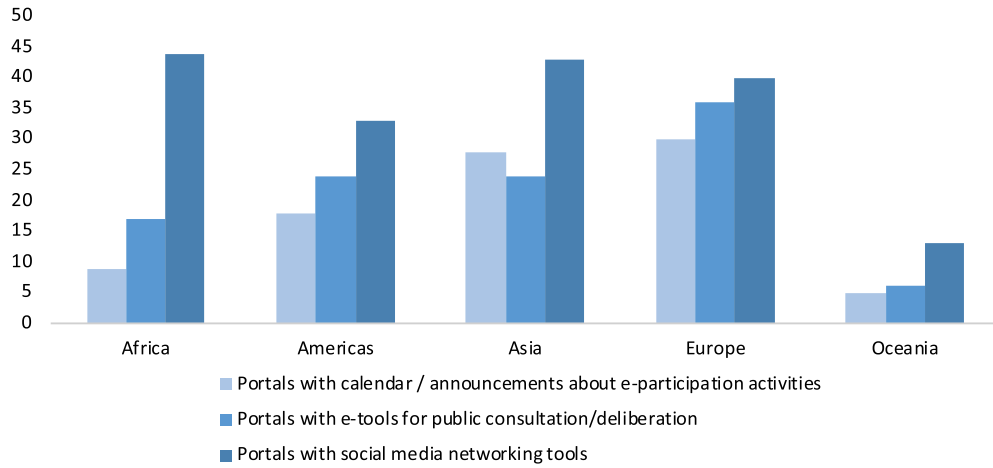
Figure 5.7 Proportion of national portals with information on people's right to access government information, by region



Source: 2020 United Nations E-Government Survey.

government portals and websites. As shown in figure 5.8, most government portals have social media networking tools, and many also have electronic tools for public consultation. According to the Survey, fewer portals have calendars or announcements of upcoming e-participation activities. The highest concentration of e-consultation features in government portals is in Europe; among the 43 countries assessed in the region, 36 have e-tools for public consultation or deliberation, and 30 have calendars or announcements of e-participation activities. As a share of the regional total, Africa has the fewest mechanisms for online consultation; among the 54 countries assessed, 17 provide e-tools for public consultation or deliberation, and 9 have calendars or announcements publicizing e-participation activities.

Figure 5.8 Number of countries offering selected features for online interaction, by region, 2020

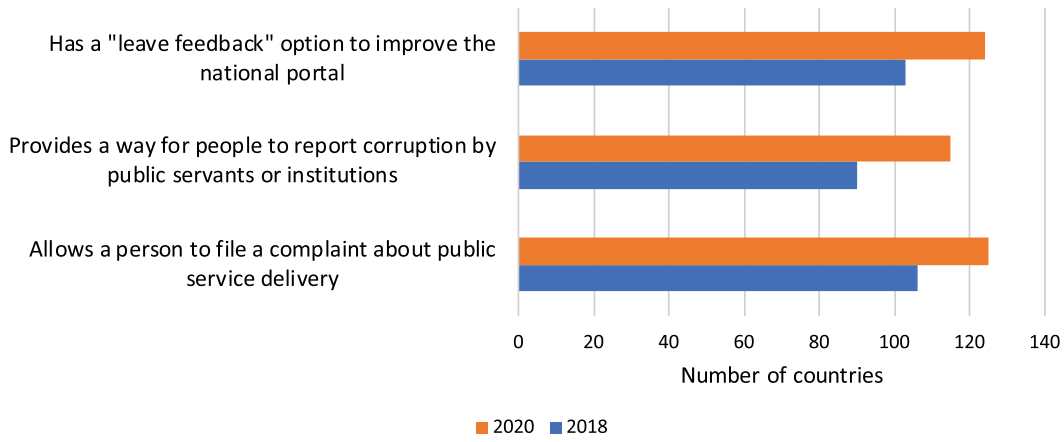


Source: 2020 United Nations E-Government Survey.

There has been an increase since 2018 in the number of government portals offering options for users to provide feedback about the site, to file complaints about service delivery, and to report corruption by public servants or institutions. These functions are now available in a majority of countries around

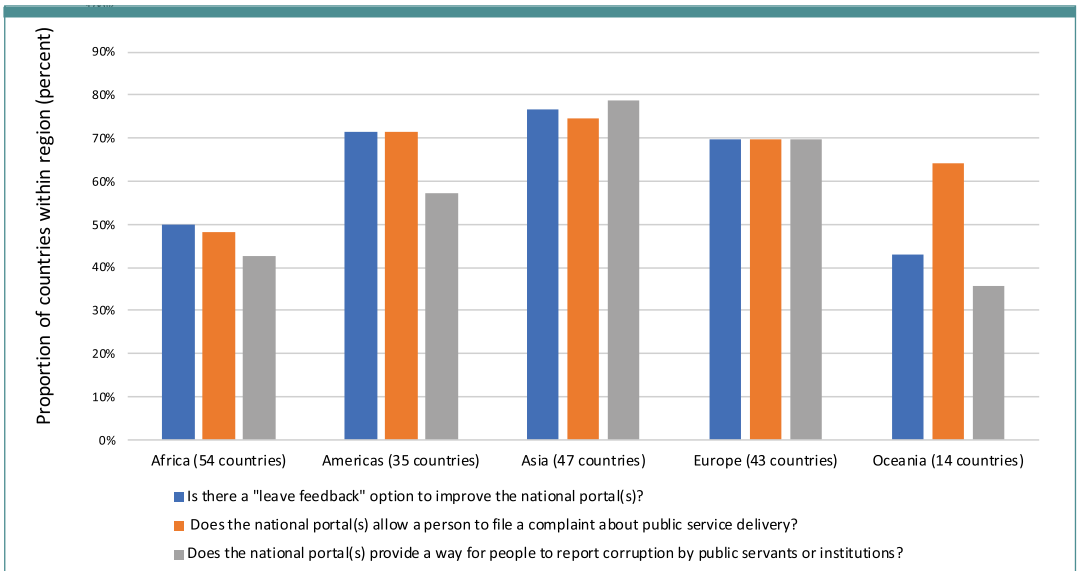
the world (see figure 5.9). More than 70 per cent of the countries in Asia offer these features, while in Africa the corresponding rates are between 40 and 50 per cent (see figure 5.10).

Figure 5.9 National government portals with selected feedback and reporting features, 2018 and 2020



Source: 2018 and 2020 United Nations E-Government Surveys.

Figure 5.10 Proportion of national government portals with selected feedback and reporting features, by region, 2020



Source: 2020 United Nations E-Government Survey.

Recent years have seen what can best be described as a proliferation of e-consultation mechanisms for functions such as policymaking, regulatory reform, feedback on public services, complaint management, and idea generation (ideation). Table 5.3 provides examples of national e-participation mechanisms highlighted by Governments in the 2020 Member States Questionnaires (MSQs). Many of the platforms listed in the table are multifunctional and support several participation mechanisms.

Ideation forums—public platforms that allow people to submit ideas or proposals—have multiplied in recent years. They cover a wide spectrum in terms of institutionalization; some platforms are relatively unstructured and have no pre-established links to formal decision-making processes, while

Box 5.3 The Tawasul complaint system in Bahrain

Tawasul, a national suggestion and complaint system in Bahrain, was launched in January 2014. The service is accessible from computers and mobile phones through an application developed for IOS and Android. The system enables residents to submit their suggestions and complaints to any government entity in the Kingdom of Bahrain from anywhere at any time. Individuals submit their complaints through the portal and have the option to upload documents; they are then given a reference number that allows them to track the status of their request. Every government entity participating in Tawasul has set up a dedicated team to handle the suggestions and complaints, and the team must comply with preset performance indicators and time frames for response depending on the case category. According to statistics provided on the portal, the site has received several thousand cases every year it has been in operation, and more than 94 per cent of these cases have been closed.

Sources: Tawasul (services.bahrain.bh/wps/portal/tawasul).

Table 5.3 Examples of different types of e-participation on national websites

E-participation mechanism	Country	Platform URL
Access to information		
Single Portal for Requesting Access to Public Information	Dominican Republic	saip.gob.do
Public feedback and complaints		
Co-Government Platform	Albania	www.shqiperiaqeduam.al
Tawasul	Bahrain	services.bahrain.bh/wps/portal/tawasul/Home_ar
Interactive (*hudong*) website	China	www.gov.cn/hudong
Participation Citoyenne	Côte d'Ivoire	www.participationcitoyenne.gouv.ci
The 3-1-1 System	Dominican Republic	311.gob.do/sugerencia
Rate the Public Service	Malta	meae.gov.mt/en/Pages/RateApp.aspx
Citizen Support portal	Mauritius	www.csu.mu
Complaint management ticket system	Philippines	ereklamo.dswd.gov.ph
OneService (Municipal Services Office)	Singapore	www.oneservice.sg
e-people website	Republic of Korea	www.epeople.go.kr
Wananchi portal	Tanzania	https://www.wananchi.go.tz
Consultation platforms		
Consulta Pública	Argentina	consultapublica.argentina.gob.ar
Unified website for the publication of draft legal acts	Armenia	www.e-draft.am
Urna de Cristal	Colombia	www.urnadecristal.gov.co
Participation Citoyenne	France	consultation.etalab.gouv.fr
Participa	Mexico	participa.gob.mx
Eparticipation	Morocco	www.maroc.ma/fr/participation-electronique
Engaging with government	New Zealand	www.govt.nz/browse/engaging-with-government
REACH	Singapore	www.reach.gov.sg
USA's Regulation.gov	United States	www.regulations.gov

Source: 2020 United Nations E-Government Survey; 2020 Member States Questionnaires.

Note: Many of the platforms are multifunctional and offer several of the forms of participation listed in the table.

Table 5.3 Examples of different types of e-participation on national websites

E-participation mechanism	Country	Platform URL
Uruguay	Uruguay	www.gub.uy/participacion-ciudadana
Citizens' initiatives, e-petitions and similar mechanisms		
Asamblea Legislativa Participe y Consulte	Costa Rica	http://www.asamblea.go.cr/ca/SitePages/Participe%20y%20consulte.aspx
Citizens' initiatives website	Finland	www.kansalaisaloite.fi/fi
Citizens' Initiative portal	Estonia	rahvaalgatus.ee
Manalbass	Latvia	manabalss.lv
Russian Public Initiative	Russian Federation	www.roi.ru
Petitions to Parliament	United Kingdom	petition.parliament.uk
Ideation forums		
Ideya Banki (idea bank)	Azerbaijan	www.ideya.az
Idea exchange platform	Luxembourg	www.vosidees.lu
Online participation platform	Switzerland	engage.ch
Participatory budgeting		
Orçamento Participativo Portugal	Portugal	opp.gov.pt
National participatory budget website	Republic of Korea	www.mybudget.go.kr
Collaborative development (co-creation)		
Software Público (open source public software)	Colombia	www.softwarepublicocolombia.gov.co

Source: 2020 United Nations E-Government Survey; 2020 Member States Questionnaires.

Note: Many of the platforms are multifunctional and offer several of the forms of participation listed in the table.

others are more structured systems with a solid legal foundation and a clear position in the formal institutional system. National e-petition platforms are also on the rise, sustaining a trend that started in the past decade. A third type of participatory mechanism that has garnered a lot of recent attention is citizens' initiatives, whereby individuals submit proposals that, providing certain conditions are met, can be presented for direct popular vote without passing through executive or legislative institutions. Other recent trends have included crowdsourcing initiatives such as hackathons and innovation competitions focused on the creation and development of new e-services.

An increased focus on "advanced" e-participation tools and mechanisms is evident in contexts other than the Survey. For instance, at least two dozen of the initiatives submitted by Governments for the United Nations Public Service Awards in 2018 and 2019 were fully relevant to e-participation.[8] The initiatives came from all regions, with Asia, Latin America and Europe most represented, and covered various forms of e-participation, including consultations, feedback mechanisms, co-production, e-petitions and participatory budgeting.

The Survey systematically tracks only some of those e-participation channels and mechanisms. Figure 5.11 shows the evolution in the number of countries with evidence of having conducted online consultations in different sectors in the 12 months preceding the publication of the 2014, 2016 and 2020 Surveys; related activity was verified through the inspection of relevant department websites. As documented in the 2018 Survey, this indicator saw a rapid increase for all sectors between 2014 and 2018. The 2020 Survey results confirm the continuation of this trend, with evidence of online consultations present in more than 50 countries for each of the six sectors assessed. This is still a minority of countries; however, online consultations may be conducted through channels other

Box 5.4 Participatory budgeting in the Republic of Korea: combining participatory budgeting at different levels of government

Participatory budgeting has existed for more than 30 years at the municipal level; applications at the national level are more recent and less common. The Republic of Korea offers an example of a country that integrates well-developed participatory budgeting at the local and national levels.

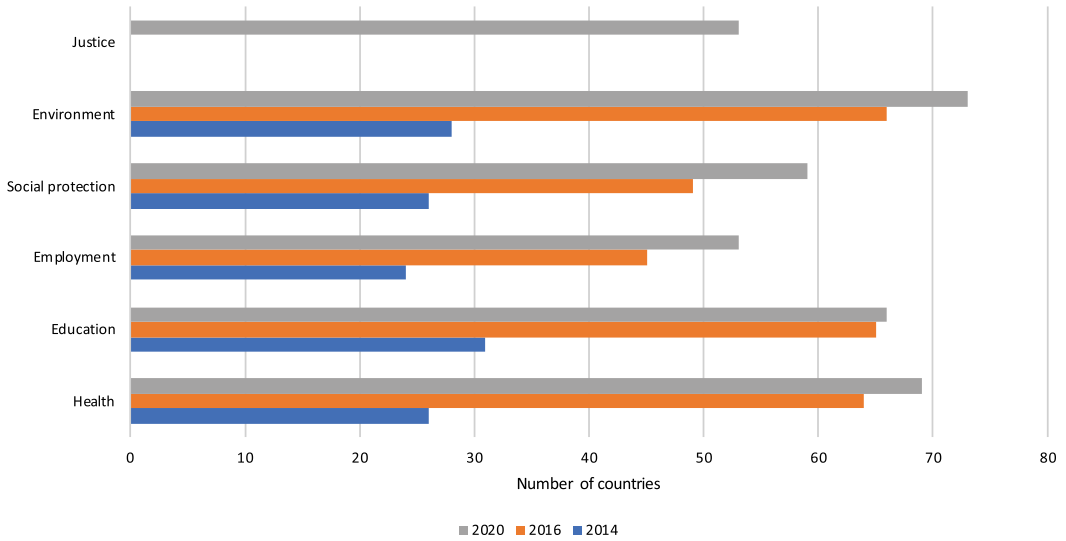
The national participatory budget system in the Republic of Korea is designed to enhance the transparency of financial operations and increase the public's interest in the budget by allowing people to make budget proposals and participate in the screening and prioritization of proposals. For some time, it had been possible for the general public to come up with ideas or suggestions for improvement, with relevant ministries responding to such proposals. The new participatory budget system expands the scope of participation, as citizens can participate in the review and prioritization process that comes after the public proposals. The new system complements the local participatory budget system currently used by municipal governments nationwide by eliciting proposals that require funding by the central Government. The portal includes a comprehensive timeline for the process, which combines online and offline activities.

Sources: www.mybudget.go.kr.

than those covered by the Survey, so the Survey numbers should be taken as low estimates of the real number of online consultations. In any case, the trend is clear: the "supply" of electronic consultations by Governments has continued to grow since 2018.

The prevalence of online consultation mechanisms varies widely across regions, however. Such mechanisms are found in a majority of the European countries assessed; there is evidence of e-consultations in the past 12 months for 50 to more than 70 per cent of the region's countries, depending on the sector, and more than 80 per cent of the countries show evidence of at least one e-consultation having been conducted in the past 12 months. Online consultation mechanisms are much rarer in Africa, where evidence of e-consultation in any of the six sectors covered during the past 12 months could be found for only 8 of the 54 countries assessed (see figure 5.12).

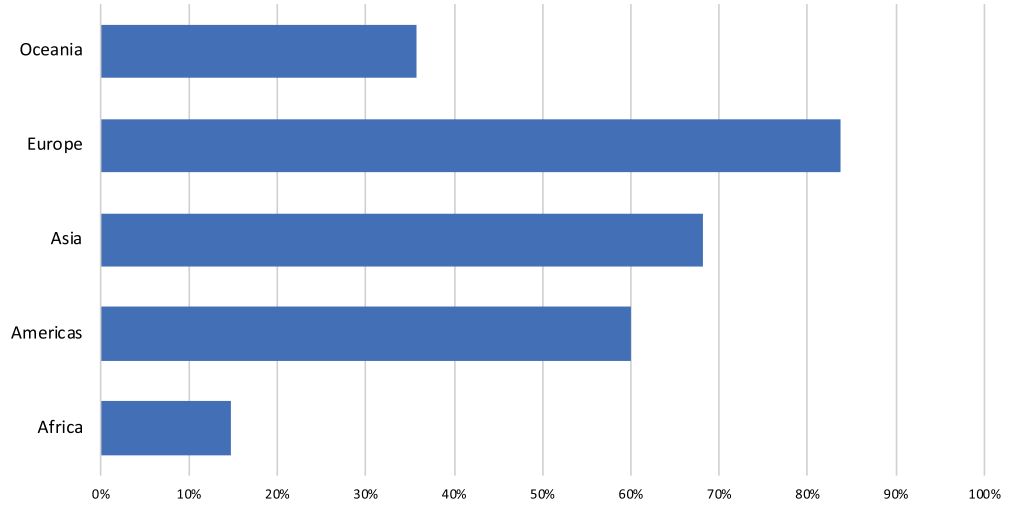
Figure 5.11 Number of countries with evidence of online consultations held in the preceding 12 months, by sector, 2014, 2016 and 2020



Source: 2020 United Nations E-Government Survey.

Note: As the justice sector component was added in 2020, no comparative data are available for 2018

Figure 5.12 Percentage of countries with evidence of online consultations held in the past 12 months, by region, 2020



Source: 2020 United Nations E-Government Survey.

Note: The figure reflects the proportion of countries in each region in which evidence was found of at least one e-consultation having been conducted in the past 12 months in the any of the following sectors: education, health, environment, social protection, labour or justice.

The Survey also looks for evidence that people's input was included in decision-making in the past 12 months. Many countries provide this kind of feedback for each consultation featured on the relevant e-participation websites, though the feedback comes in different forms. Some countries post general summaries of the comments made and the general lines of how they were taken into account by the Government in decision-making. Others provide more detailed reports on the contributors and/or their contributions. Still others choose to post each input or comment they receive in its entirety, offering full transparency on that side of the policymaking process. Examples of this third option can be found on the Ministry of Health website in Singapore (https://www.moh.gov.sg/proposed-tobacco-control-measures) and on the New Zealand Medicines and Medical Devices Safety Authority website (https://www.medsafe.govt.nz/index.asp). In general, there tend to be fewer details on how specific comments were or will be addressed to revise policy drafts.

There is a trend towards multifunctional participation platforms. Many e-participation platforms offer a variety options such as opinion surveys, ideation forums, and consultations on new policies (including draft laws and regulations) on the same website. The public participation websites in Morocco and Tunisia exemplify this trend. These types of platforms may also allow users to submit complaints and reports of public corruption, as is the case in Albania. Finland has a very comprehensive platform—demokratia.fi—that incorporates a wide range of features and tools, including national and local citizens' initiatives, consultations, an ideation forum, an opinion forum, and information on elections.

In many countries however, different types of e-participation activities are offered on separate platforms. Tunisia, for example, has one platform for policy consultations, ideas for improving government, and public debates (Portail de la participation publique, fr.e-participation.tn/a) and one platform for information, suggestions, forums, surveys, and reports on the misuse of public funds (e-people, https://www.e-people.gov.tn/main.do). Countries that are members of the Open Government Partnership have dedicated platforms that may include consultation activities (examples include Paraguay and Italy). Others have different platforms for feedback on public administration, feedback on different public services, consultations on draft policies, and other activities.

The large number of potential users among local governments has created a market for e-participation platforms. Many companies and not-for-profit organizations have off-the-shelf products that offer a range of "standard" e-participation features such as voting, petition systems, consultation forums, participatory budgeting, user surveys, and calls for proposals.[9] Some of them are open source; CONSUL, the platform used by Decide Madrid, is one example (see box 5.5). The Government of France provides a tool for comparing existing platforms in order to help local governments that wish to set up public consultations select the appropriate platform for their needs.[10]

Box 5.5 Decide Madrid: a multipurpose platform

In 2015, the city of Madrid created the Decide Madrid web platform with the objective of promoting the direct participation of residents in key government processes. The platform is a web-based tool that facilitates several types of participatory processes, including the following: (a) *ideation forum:* any resident can present a proposal to improve the city; a proposal that receives a sufficient level of support is put to a popular vote, and if approved it becomes binding for the municipality, which commits to its implementation; (b) *consultations:* before carrying out certain actions, the City Council consults residents about the criteria that should be followed or gives them the opportunity to choose between alternative projects; (c) *participatory budgeting:* the City Council reserves a specified amount of money for projects proposed and voted on by residents; in 2016 and 2017, € 100 million was allocated annually—the largest amount dedicated to participatory budgets in the world at that time.

CONSUL, the software platform used for this project, is open source and is used by many institutions around the world (130 entities in 33 countries), including the cities of Buenos Aires, Montevideo and Turin. The wide diffusion of this technology has allowed administrations that use the tool to share knowledge and experiences.

Levels of engagement within the Decide Madrid framework have been high; thousands have participated in consultations on strategic plans, new municipal regulations, participatory budgets, urban projects, and constituents' proposals on sustainability and transport.

Sources: Author's elaboration based on information obtained from the United Nations Public Service Awards database, available at https://publicadministration.un.org/unpsa/database/Home/UNPSA-Initiatives-and-the-SDGs; and from CONSUL, available at http://consulproject.org/.

Boundaries between public and private e-participation initiatives have become increasingly blurred over the past decade. Both private sector firms and non-profit organizations have built platforms for popular action and user feedback. Some well-known platforms include I Paid A Bribe (India) to report corruption and change.org to start a petition. In France, Make.org organizes large-scale consultations on behalf of coalitions of non-governmental actors but also works with government entities.

More generally, the development of Web 2.0 and Web 3.0 functionalities (including social media interactivity and semantic social networking) has led to a dramatic increase in the volume of one-to-many and many-to-many communication among people. In many countries, people-to-people platforms (not moderated by the Government) aim to generate ideas that people would like to see featured on the political agenda. These forums can attract more traffic than government-led participation platforms, which places them in competition with official forums. An example of this is the range of ideation forums (or assimilated tools) in the Russian Federation; there are at least six tools with relatively similar functions and intended audiences.[11] For at least a decade, Governments have recognized how important these people-to-people forums are for "feeling the pulse" of the population. The line dividing people-to-people forums and government-mediated forums has become somewhat porous, as government officials may participate in and monitor the content of non-government-moderated forums.

As noted in previous editions of the Survey, successful e-participation initiatives include a combination of online and offline activities. Well-developed e-participation initiatives have integrated "packages" of online and offline activities in areas such as e-rulemaking, environmental impact assessment, climate change action, and participatory budgeting. Activities that are often carried out in support of e-participation include advertising the initiatives, developing and disseminating outreach plans, alternating electronic and physical meetings, providing educational material on the issues being discussed, and establishing connections with other programmes or initiatives. Such activities are closely linked to the institutionalization of e-participation initiatives within organizational processes—a key factor of success.[12]

5.3 An analysis of e-participation: putting the trends identified from the Survey in perspective

As noted in previous sections of this chapter, the Survey does not capture all of the dimensions of e-participation. Therefore, the relevant Survey data need to be interpreted in the light of other important factors, some of which include the development of e-participation tools not included in the scope of the Survey, the evolution of the design of e-participation initiatives and their connection with other aspects of e-government, the extent to which people take advantage of the e-participation opportunities provided by Governments, and the impact of e-participation initiatives. At present, there are no global data collection efforts focused on these areas, so developments and trends must be inferred from the limited amount of scattered evidence available. Generally speaking, much more research is available on Europe and North America than on other parts of the world. This section provides information on some salient developments and trends identified through an analysis of the recent literature.[13]

5.3.1 The low uptake of e-participation opportunities

The "demand" for e-participation seems highly variable across contexts, including countries, sectors, and nature of participation. As an example, available survey data for Europe indicate that, in spite of a rapid increase in the availability of online services between 2014 and 2019, the proportion of individuals engaging in e-consultation or e-voting has not changed at the scale of the region.

A look at national participation platforms shows unequal levels of participation across platforms, as measured by the numbers of inputs (for ideation forums), the number of items proposed for consultation, the number of comments on each item, or both (for consultations on draft policy). Several participation platforms show low levels of activity since their creation. In some cases, government priorities may change, or governments may create new participation platforms, which results in platforms becoming minimally active or dormant. Even countries that are very advanced in e-government have experienced challenges with regards to e-participation.

5.3.2 Technology factors

Within the realm of e-government, the digital divide has been a concern from the beginning. Challenges surrounding the lack of physical access to ICT remain a critical issue for many developing countries, especially least developed countries (LDCs). In its most recent resolution on science, technology and innovation, the United Nations General Assembly emphasizes "the need to effectively harness technology to bridge the digital divides within countries and between developed and developing countries".[14] Technology constraints make it particularly difficult for developing countries to foster e-participation.

While the digital divide was initially framed in terms of access to technology (infrastructure, then Internet, then broadband), the concept has been broadened and refined to include a series of layers that combine to exclude certain groups from e-government and more generally from having a voice in digital governance. Within this broader conceptual framework, gaps in digital competence constitute an important aspect of the digital divide. The European Digital Competence Framework for Citizens (DigComp) distinguishes five dimensions of digital competence (information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving), with 21 related competences.[15]

In the case of e-participation (and especially advanced forms of participation), an additional layer of digital competence consists of the skills necessary to analyse and provide input on complex policy proposals and other initiatives presented for public review and commentary. These skills go well beyond the ability to use simple features (such as clicking the Like button on social media).[16] In the case of hackathons or other innovation competitions, participation requires very specialized skills that only a limited number of individuals are likely to have mastered.

Technological issues linked to specific forms of e-participation (such as e-petitions) have been extensively explored. However, questions remain about the degree to which various technological advances have increased or improved e-participation. Social media are a case in point. At the beginning of the 2000s, Governments had high expectations surrounding social media in terms of the potential role they could play in advancing e-participation. Because of their interactive features, social media were often presented as a means of promoting two-way communication and enhancing the level and quality of participation. A decade later, analyses of social media content from e-participation platforms and channels consistently showed that social media were used mostly to inform the public and were rarely used for consultation purposes; this was observed for both national and subnational governments.[17] In other words, governments did not exploit the two-way communication features of social media to the extent initially expected. One key concern has been that social media are not necessarily conducive to rational discussions that meet the criteria of deliberative democracy.[18] Social media are not specifically set up to support the organization of meaningful consultations in complex areas such as rulemaking. This remains a concern in spite of the development of increasingly sophisticated methods for analysing social media content. Another issue that has prompted serious concern, particularly in recent years, has been the growing use of social media to disseminate false information and to polarize the public debate. This has obvious implications for the potential of e-participation mechanisms to achieve their intended goals.

5.3.3 Strategic factors at the level of individual initiatives

While the technological dimension of e-participation is clearly important, the exclusive or quasi-exclusive focus on technology has been perceived as limiting (and even causing the failure of) e-participation projects since the beginning of e-participation as a distinct sphere of activity.[19] Evaluations of e-participation initiatives have consistently pointed out that simply setting up platforms for e-participation is not sufficient to stimulate participation. More broadly, technology alone cannot be expected to increase civic engagement and participation. Aspects of organizational change in public institutions and broader socio-technological considerations are also critical in understanding and improving the performance of e-participation initiatives.

The failure of e-participation initiatives can often be traced to the lack of clear objectives. This is not specific to e-participation initiatives, having been observed in the 1970s, before e-government was introduced. Because e-participation is often conceived as a means to promote popular engagement and democracy, e-participation projects often (implicitly or explicitly) incorporate public education and support-building objectives—the realization of which entails costs and requires adequate

resources. Failing to take such objectives (and the attendant logistical considerations) into account in e-participation projects can lead to disappointing performance.

Failing to properly analyse stakeholders' motivations to engage can lead to missed opportunities to tap into skills and competencies people might have for co-producing public services, co-creation and innovation, and contributing to the policy debate. Many e-participation initiatives have suffered from what is sometimes referred to as "shallow stakeholder analysis".[20] E-participation projects typically have many stakeholders. The central stakeholders are citizens (or citizens' groups), politicians and public administrators, but every e-participation project also has additional stakeholders.[21] The sustained success of e-participation initiatives largely depends on how well the initiatives align with the expectations, needs and incentives of stakeholders. Motivating factors tend to vary across stakeholder groups. Politicians may be mainly interested in communicating and advocating for their agendas. Public administrators' expectations and reasons for fostering participation are shaped by the institutional ethos and culture, legal considerations and other factors, and are framed by their perceptions of the value participation mechanisms can create. For members of the general population, motivations and incentives to engage—and levels of commitment—can be extremely diverse (see box 5.6).

Box 5.6 Heterogeneity of stakeholders' motivations and commitment: e-petitions and co-creation

E-petitions. People are motivated to start or sign e-petitions for a variety of reasons. In Germany, it was found that a small number of activists involved in the petition process participated in several areas of advocacy, while the majority of signatories were focused on only one type of issue.

Co-creation. The motivations for people to engage in co-creation are not necessarily similar to those underlying other forms of e-participation. Visibility and career advancement are clear motivating factors in some cases; a study of the motivations of participants in 11 open data hackathons organized by the agriculture department in the Netherlands showed that the contestants were predominantly motivated to engage in the competitions as part of their work—though the developers and problem owners involved in the events were mainly motivated by fun and enjoyment.

Sources: A. Jungherr and P. Jürgens, "The political click: political participation through e-petitions in Germany", *Policy and Internet,* vol. 2 (2010), pp. 131-165; and A. Purwanto, A. Zuiderwijk and M. Janssen, "Citizens' motivations for engaging in open data hackathons" (2019), pp. 130-141.asp?2019/8/2/77/264850.

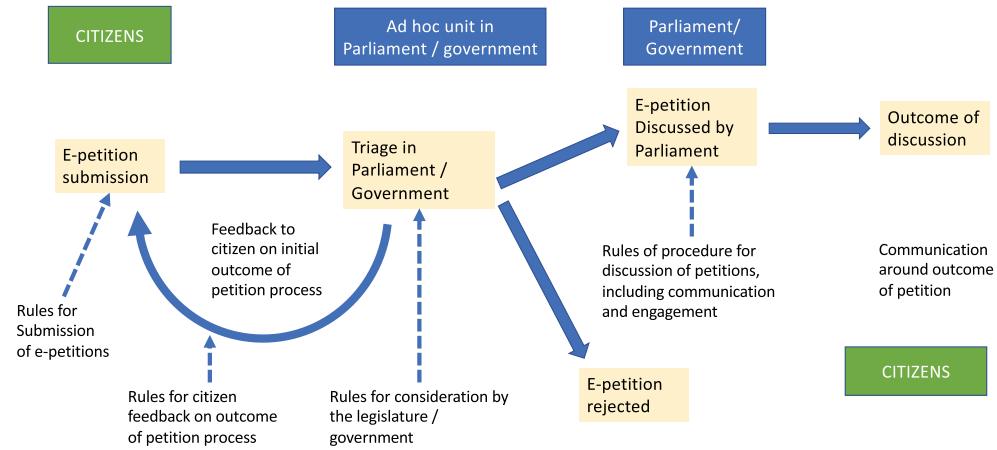
Incentives or reasons for engagement can also vary over time. For example, it has been observed that politicians' engagement on participatory platforms is strongly linked to the electoral cycle. Yet, support from the political side has been shown to be a key factor in the success of e-participation initiatives.[22] People's motivation to participate can decrease over time when they feel that their contributions are not recognized by the Government; this was observed for e-petitions in the United Kingdom before the new collaborative e-petition system was put in place.[23]

Two decades of experience with e-participation have shown the critical importance of linking e-participation initiatives with formal institutional processes. In the field of policymaking, this means clearly defining and publicizing the process through which input from citizens will be taken into account in decision-making. In the field of service delivery, this means putting in place mechanisms through which public authorities can act on people's feedback and compel service providers to respond to it.

The number of steps involved in linking e-participation processes to decision-making processes should not be underestimated. The relative complexity of this process is illustrated below in a generic way for e-petitions submitted to a parliamentary body (see figure 5.13). Each step requires one or

more rules dictating how the process can move to the next step. Each step also requires resources. For example, when the new e-petition process was set up in the United Kingdom in 2015, a Petitions Committee was created in Parliament. The Committee is in charge of receiving the petitions and managing the process surrounding their consideration by Parliament, including moderation and engagement with the public.[24] A lack of clear rules at any point in the process or a lack of resources to ensure that petitions are duly considered by the receiving institution can cause the process to fail, which in turn can cause popular disenchantment with the process (see box 5.7).[25]

Figure 5.13 Linkages between e-participation processes and formal decision-making processes: the case of e-petitions sent to the parliament



Source: Author's elaboration based on M. Asher, C. Leston-Bandeira and V. Spaiser, "Do parliamentary debates of e-petitions enhance public engagement with parliament? An analysis of Twitter conversations", *Policy and Internet*, vol. 11, pp. 149–171.

Box 5.7 The formal process for addressing e-petitions influences people's trust in public institutions

E-petitions—the online version of petitions, through which supporters can submit a policy for direct consideration by representative institutions—have been a popular form of e-participation over the past two decades. During this period, many countries have put new e-petition systems in place or have adapted old petition systems to e-government. Petitions are considered a mechanism for high-level participation, as they allow people to influence the policy agenda of formal representative institutions.

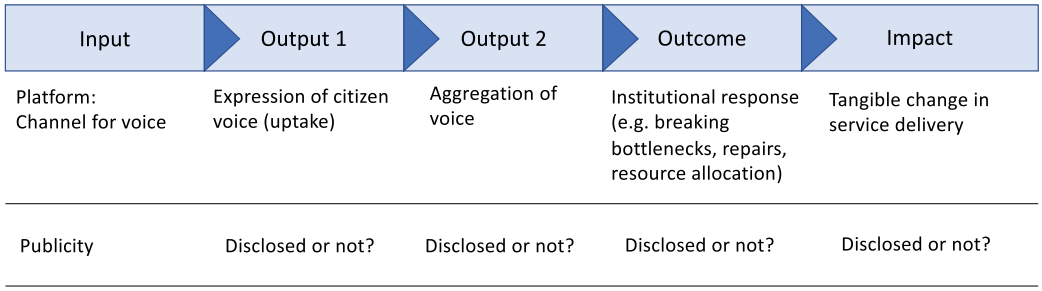
Recent studies have used modern data analysis to shed light on the complex causal linkages between e-participation and trust in public institutions. A study of Twitter conversations around the e-petition system in the United Kingdom highlights how people perceive the fairness of the process by which petitions are addressed in Parliament. The study shows that the public's perception of Parliament may be influenced more by the design of the "downstream" process than by the final outcome of the petition. According to the study findings, issues that seem to matter include how closely the subject of the discussion follows the original petition, how adversarial the discussion process is, and whether the parliamentary process provides a balanced opportunity for all parties to present their views.

Sources: M. Asher, C. Leston-Bandeira and V. Spaiser, "Do parliamentary debates of e-petitions enhance public engagement with parliament? An analysis of Twitter conversations", *Policy and Internet*, vol. 11, pp. 149-171.

In the case of e-participation in the context of public services, the links from e-participation mechanisms (for example, channels for public feedback) to increased government responsiveness involve several steps and different accountability mechanisms (see figure 5.14). As is the case for

e-participation geared towards enabling people's input into decision-making, the mere existence of electronic platforms is not a guarantee of increased government responsiveness and accountability in public services provision. A recent survey of ICT-enabled feedback platforms in developing countries distinguishes between platforms that collect individual feedback and those that aggregate input or feedback, though it is noted that many platforms can do both. The study emphasizes that the public disclosure of people's feedback is of critical importance in ensuring the full operationalization of the different accountability mechanisms. The study highlights the absence of any discernable correlation between platform use and government responsiveness (see box 5.8); some platforms with high user uptake are found to be associated with low government responsiveness, and vice versa.[26]

Figure 5.14 From e-participation processes to accountability: the case of public services



Source: Tiago Peixoto and Jonathan Fox, "When does ICT-enabled citizen voice lead to government responsiveness?" In *IDS Bulletin: Opening Governance,* Duncan Edwards and Rose McGee, eds., vol. 47, No. 1 (January 2016), available at https://doi.org/10.19088/1968-2016.104.

Box 5.8 Two forms of accountability for public service delivery

In their survey of 23 ICT-enabled platforms for citizen voice, Peixoto and Fox identify two forms of accountability for service delivery: upwards accountability and downwards accountability. With upwards accountability, service providers (such as utilities) are accountable to a higher authority in government. With downwards accountability, public disclosure of the performance of public services creates pressure for institutional responsiveness. Essentially, the public disclosure of feedback tends to activate a government response that reflects downwards accountability; when feedback is not publicly disclosed, the pathway to government response is generally via upwards accountability.

The study found that the majority of platforms (18 of 23) make citizen feedback public. However, no pattern emerged that indicated a link between the disclosure of feedback and institutional responsiveness.

Sources: Tiago Peixoto and Jonathan Fox, "When does ICT-enabled citizen voice lead to government responsiveness?" In *IDS Bulletin: Opening Governance*, Duncan Edwards and Rose McGee, eds., vol. 47, No. 1 (January 2016), available at https://doi.org/10.19088/1968-2016.104.

Like other forms of participation, e-participation comes with costs and benefits, and these can be assessed from the perspective of the Government (the implementer), the perspective of users (the participants), or both. Measuring the costs of e-participation is conceptually and empirically difficult. Measuring the benefits is even more difficult, given the often unclear objectives and performance indicators for specific e-participation initiatives and the existence of broader objectives such as citizen education, increased civic engagement and trust in public institutions. To some degree, the costs can be better measured as the institutionalization of e-participation progresses (for example, as new positions are created within organizations to manage e-participation initiatives, with accompanying resources); this contrasts with contexts of early adoption, where organizational processes have not yet adapted.

In general, knowledge of the outcomes, impacts and effectiveness of e-participation initiatives is limited. Evaluations of e-participation projects by Governments appear to be infrequent. There seems to have been no systematic effort made to compile participation rates for similar instruments across countries, and there are no clear benchmarks to indicate what "good" levels of participation look like. It is clear that measuring the usage of e-participation tools and opportunities is not sufficient to assess progress or success; however, indicators for measuring improvements in policy and decision-making and in the quality of public services are rare, and evidence of the impact of e-participation on those areas is mixed. There is a need for more studies assessing the outcomes of e-participation initiatives, particularly in developing countries.

Box 5.9 Evaluating e-participation initiatives

In general, the literature emphasizes that evaluating e-participation initiatives requires going well beyond technical or technological considerations. Several evaluation frameworks specific to e-participation have been developed. The most commonly used framework, developed by Macintosh and Whyte, was adopted (in slightly modified form) by the European Democracy Network (DEMO-net). This framework evaluates project-related, socio-technical and democratic features of e-participation. A framework developed by Smith, Macinstosh and Millard focuses on operational outputs, outcomes and impacts. In practice, case studies of e-participation projects found in the literature tend to concentrate on a few aspects rather than providing comprehensive assessments facilitated by evaluation frameworks such as those just mentioned. Another useful framework, developed by Toots, highlights the relationships between stakeholders and focuses on understanding why e-participation projects fail.

Some of the initiatives highlighted by Governments for the 2020 Survey have been examined by academics or e-participation practitioners. In general, Governments appear to have a more positive view of their initiatives than do the researchers. In fact, several initiatives were deemed by non-government evaluators to be partial successes at best. This points to the need for more systematic evaluation of e-participation projects by Governments, ideally in cooperation with external experts.

Sources: A. Macintosh and A. Whyte, "Towards an evaluation framework for eparticipation", *Transforming Government People Process and Policy*, vol. 2 (2008); S. Smith, A. Macintosh and J. Millard, "A three-layered framework for evaluating e-participation", *Int. J. of Electronic Governance*, vol. 4 (2011), pp. 304-321; and M. Toots, "Why e-participation systems fail: the case of Estonia's Osale.ee", *Government Information Quarterly*, vol. 36, No. 3 (2019), pp. 546-559.

5.3.4 Social factors

The introduction of engagement mechanisms and participation processes often generates high expectations from people, especially when such measures are advertised by the Government as opportunities to reduce the distance between formal institutions and citizens. If people can see over time that their input is given serious consideration and the associated processes are transparent, e-participation can lead to increased trust in public institutions. Conversely, the perception that e-participation processes are disconnected from and do not really impact decision-making or service delivery can reduce trust in public institutions. E-participation (like any form of participation) can thus be a double-edged sword.

The take-up and sustained use of e-participation opportunities are largely dependent on people's trust in government institutions, but their trust of the Internet and of specific components of participation platforms is also a factor. Privacy and security concerns appear to have intensified in recent years, fuelled by well-publicized breaches of private databases and social media platforms, reported instances of government surveillance of individuals through their social media accounts, and other such developments. These concerns are reflected in the discourse surrounding identification and anonymity in e-participation. This is an important issue with relevance to a wide range of contexts, including e-petitions, e-rulemaking, living labs, citizen feedback and crowdsourcing.

5.3.5 Institutional factors

The institutionalization of e-participation—the process through which e-participation becomes fully integrated into the organizational culture—is crucial to its success. Understanding the process of institutionalization is crucial from the perspective of fostering digital transformation in public administration, but little headway has been made on this front.[27] Existing studies of the diffusion of technology in government highlight the complementary relationship between the passive observation of practices inside and outside government, peer networks, and institutional guidelines but provide no definitive explanation or analysis of the process of institutionalization.[28]

Inclusion in development plans and budget allocations is typically part of the institutionalization process. In practice, (e-)participation is often a relatively "invisible" activity in terms of planning and budgeting. Information produced by government departments on the specific costs attached to e-participation projects is not easily available. Case studies dating from the early days of social media adoption in developed countries indicate that the social media activities of Governments were often carried out within existing structures and using existing resources, causing bottlenecks and weakening the capacity of organizations to handle e-participation effectively. Anecdotal evidence suggests that this may still be happening. The issue of e-participation costs is also largely absent from the empirical academic literature. This lack of information precludes a better understanding of the conditions under which it would make sense for Governments to invest more in specific types of participatory mechanisms. Because meaningful participation entails a range of activities beyond the participation interface itself, low participation budgets may lead to the perpetuation or exacerbation of existing power differences.

Legal and regulatory frameworks can stimulate or impede e-participation. At a fundamental level, provisions for public participation spelled out in a country's constitution or other legislation frames the space in which e-participation can take place. Legal frameworks for access to information and transparency have been identified as critical sources of support for public participation. E-participation is also affected by laws and regulations relating to telecommunications, cybersecurity and cyberterrorism; the level of legal activity in these areas has increased sharply in recent years and is generally driven by concerns unrelated to e-participation, but such laws nonetheless have an impact on public engagement and interaction.

It is important that clear guidelines be developed at the organizational level for communication by public officials and administrators on social media. Studies from the late 2000s showed that civil servants were often unsure about the tone they should use or the nature of the information they could provide on social media. Also common were legal questions relating to matters such as record-keeping requirements for online engagement outside of standard channels, copyright issues, and the ownership of data produced through third-party platforms used by Governments. Security and privacy issues were already present, and their salience has only increased in recent years. Social media guidelines for government department staff are now commonplace in many countries. However, there is often some tension between highly regulated communication guidelines and the practices of social media, which call for quick exchanges and high interactivity. There is a possibility, as the institutionalization of e-participation progresses, that innovation could be stifled.[29]

The success of e-government initiatives is largely contingent upon the values that prevail in public administration as a whole and among distinct public entities and individual staff members. The ethos of a Government and the values promoted by individual institutions determine how interaction with the public is perceived and guide the way ICT is integrated to mediate that relationship.[30]

In practice, the mix of values prevailing in public administration as a whole and in specific departments needs to be taken into account in assessing the likelihood of success of e-participation initiatives. Studies have highlighted the importance of agency leadership in the adoption of e-participation and have also shown that prevailing norms at the organizational level influence how e-participation is implemented. The degree of openness among staff in the organization to the idea of public participation is a key factor, as is the balance of views on whether e-participation should primarily be geared towards improving institutional performance (making regulations or services better, for instance) or towards the pursuit of broader goals (such as educating the public or increasing civic engagement).

Issues addressed by government agencies tend to be complex and often involve conflicting stakeholder interests and trade-offs between societal values. In such contexts, expanding public participation can be seen as another risk potentially requiring mitigation—in addition to being a costly and human-resource-intensive process. This provides a strong disincentive for government agencies to extend engagement beyond what is legally required.[31] The urge to retain control of the agenda and policy debates may always be present to some degree and may lead to the temptation to influence the discussion in overt or covert ways.[32]

At a broader level, the success of e-participation and the impact it may have on the relationship between people and the State depend on the prevailing values that underlie the political system in a country.[33] In countries that have adopted a variant of liberal democracy, there may be little impetus or incentive for the political elite and representative institutions to relinquish their power over agenda setting and decision-making. In other contexts, the lack of freedom of expression and other limitations of civic space can constitute a barrier to the more political forms of e-participation; in such contexts, Governments can be expected to organize e-participation around public service delivery, focusing on public feedback mechanisms, the co-production of public services, and non-politically-threatening modes of co-creation (such as hackathons and innovation competitions).

5.4 Issues for the attention of policy makers

Fifteen years after the term Web 2.0 was coined, the record of e-participation is mixed. On the one hand, successive editions of the United Nations E-Government Survey have illustrated the steady development of the "supply" side of e-participation. E-participation tools have diffused quite rapidly from developed to developing regions. Most countries now have frameworks for access to information in place, and many have also instituted some form of electronic consultation with people at the national level. Web 2.0 technologies have facilitated the development of genuinely new participation mechanisms and processes and have helped popularize innovations such as e-petitions and ideation forums. E-participation is also visibly more institutionalized than it was a decade ago, having moved from pilot-initiative to mainstream status in many countries. Notwithstanding this, the digital divide remains a concern in many areas of the world. Low levels of digital competence and ICT access prevent people from taking advantage of e-participation opportunities. Technological barriers also continue to be important for some Governments, in part because they affect the capacity of government agencies to manage e-participation activities and integrate them into broader government operations.

On the other hand, it is not clear that increased e-participation opportunities in many countries have translated into broader or deeper public participation. The quantity and quality of e-participation vary greatly, with a wide range of factors influencing outcomes; these factors vary across time and space, and the understanding of how they interact is still limited. Detailed analyses are needed that go well beyond technological or project-level aspects and address social and institutional dimensions of change.

Many challenges observed in the field of e-participation reflect the essential differences between e-participation and other aspects of e-government. Participation is fundamentally more difficult to manage than regular administrative transactions because those who participate expect feedback as well as evidence that their contributions are valued and given due consideration. Because participation is voluntary rather than mandatory, trust in the government and public institutions plays a more important role in citizen uptake. Trust in public institutions can quickly decline if people perceive that participatory mechanisms have no influence on government decision-making. This highlights the need for careful analysis of the broader political and administrative context in which e-participation takes place and for a better understanding of the needs, motivations and incentives of all stakeholders to ensure that e-participation remains meaningful.

Below are a number of recommendations for Governments committed to developing e-participation in the coming years.

5.4.1 Project-level aspects

Be clear on the objectives of e-participation activities and understand the needs, interests, motives and incentives of stakeholders as they relate to e-participation. To achieve this, Governments can do the following:

- Define clear objectives and expectations for each e-participation process, ideally in consultation with the various stakeholders, and publish them online to ensure clarity and transparency.
- Ensure that objectives that go beyond the management of e-participation platforms and processes—such as increasing public engagement and building policy support—are "owned" by the Government and stakeholders and are appropriately resourced, monitored and evaluated.
- Conduct stakeholder analyses before each e-participation project, periodically evaluate how the various stakeholders are responding, and adjust incentives over time as needed.

Facilitate the institutionalization of e-participation processes within government departments. Governments should allocate sufficient financial and human resources to support the effective management of e-participation processes. They should also ensure that e-participation is integrated into the broader structures and processes of relevant government agencies. To promote institutionalization, Governments can do the following:

- Be mindful of the various online and offline activities that are needed to ensure sustained take-up of and engagement in e-participation initiatives.
- Reflect the costs of participatory processes (including the online and offline activities supporting e-participation) in department budgets.
- Develop the capacity to manage participatory processes in government departments, including through the development of guidelines for e-participation and the exchange of knowledge and practices across departments and agencies.
- Conduct regular internal and external evaluations of e-participation processes, making use of the expertise available in academia, think tanks and oversight institutions.
- Ensure that the evolution of popular engagement mechanisms is reflected in the culture and processes of government organizations.

5.4.2 Institutional aspects

Pay attention to the legal, regulatory and administrative environment in which e-participation takes place. The success of e-participation initiatives largely depends on the values that prevail in public administration, and the legal and regulatory environment has an impact

as well. These factors are relevant across government but also apply to individual government agencies. Governments can do the following to ensure that an appropriate environment exists for e-participation:

- Review provisions for public participation in the constitution (or other organic law), legal and regulatory frameworks for access to information and transparency, and other legislation covering communication by government agencies (including that relating to telecommunications, cybersecurity and cyberterrorism) in order to assess their potential impact on e-participation.
- Assess how regulations applying to specific government agencies or processes can stimulate or hinder efforts by agencies to engage in participatory activities.
- Promote values in public administration that are conducive to participation. Actions in this regard may include incorporating content on public engagement and e-participation in the curricula of national public administration schools, providing government department leadership and staff with training on the benefits and risks of engagement, and mandating and enforcing openness and transparency requirements.

Establish clear linkages between e-participation activities and formal decision-making processes. The introduction of engagement mechanisms and participation processes often generates high expectations. If people can see that their input is given genuine consideration, e-participation can strengthen trust in public institutions. Conversely, the perception that e-participation processes are disconnected from and do not really impact decision-making or service delivery can weaken trust in public institutions. Governments can do the following to build public trust:

- Clearly define and publicize the process by which public input is to be taken into account in decision-making.
- Make the content of public contributions and feedback as transparent as possible and publicize the impact of these contributions on the decisions made.
- Establish mechanisms through which the Government can act on feedback relating to public services and compel service providers to respond to it.

5.4.3 Social aspects

Support the acquisition of e-participation skills in the population. This should be done holistically, with attention given to strengthening the capacity of different groups in society to engage in (online and offline) participatory activities and developing the digital skills people need to enable and empower them to engage in e-participation. Governments can take the following actions:

- Promote the introduction of civic engagement and participation in school curricula.
- Include the development of skills specific to e-participation in the scope of initiatives aimed at increasing digital literacy and digital competencies in the population.

Understand how e-participation is affected by people's trust in public institutions, the Internet and social media. The take-up and sustained use of e-participation opportunities are largely dependent on people's trust in government institutions, but their trust of the Internet and of specific aspects of online participation platforms is also a factor. Within the broader context of efforts aimed at increasing trust in public institutions through enhanced transparency and accountability, Governments can do the following:

- Clearly communicate to the public the standards of privacy and security to which the Government adheres in relation to e-participation activities.

- Promote transparency in the way electronic consultations are managed and in the way people's input is addressed.
- Set and enforce standards for the responsiveness of public service providers.

Strengthen the assessment of e-participation initiatives. Lastly, a range of issues related to the evaluation of e-participation activities are amenable to economies of scale and would thus benefit from involvement from academia and international organizations and networks. Possible international initiatives could aim for the following:

- Develop indicators and benchmarks for e-participation, focusing both on specific modes (such as consultations and e-petitions) and on e-participation as a societal phenomenon.
- Evaluate the outcomes, impacts and effectiveness of e-participation initiatives in a comparative way across countries, with a focus on developing countries, where less evidence is available.

Endnotes

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7 The Survey does not systematically investigate the depth, relevance or user-friendliness of the information provided.

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6. Towards Data-Centric E-Government

6.1 Introduction

The need for government data is nothing new. For decades, the ways in which government data are gathered, secured, used and shared have been of great interest to Governments and to academics in the fields of development and public administration.[1] Government data have always been critically important, but the ways in which data are created and used have changed dramatically, bolstered by the revolution in data technologies and the proliferation of applications of different types and forms of data, including small and big data, real-time data, and geospatial data.

The 2030 Agenda for Sustainable Development has made data a focal point, acknowledging that data are key to effective decision-making and that timely, reliable, quality and disaggregated data are needed to facilitate the measurement of progress towards sustainable development and to ensure that no one is left behind.[2] The latter imperative is reflected in multiple global indicators and entails not only reaching the poorest and most vulnerable groups but also combating rising inequalities within and among countries.[3] Data and related issues and developments in the public sector have become increasingly important in terms of government analysis and operations, academic research, and real-world applicability and acceptance. Data are now integral to every sector and function of government—as essential as physical assets and human resources. Much of the operational activity in government is now data-driven, and many Governments would find it difficult, if not impossible, to function effectively without data.

At the global level, the quantity of data is expected to increase more than fivefold from 33 zettabytes[4] in 2018 to 175 zettabytes in 2025, with 49 per cent stored in the public cloud.[5] Researchers have estimated that the number of devices driven by the Internet of Things (IoT) will reach 10 times the world population (about 75 billion) in 2025.[6] These trends, coupled with the propagation of 5G networks and other next-generation devices, will also equip society with data-centric applications in areas such artificial intelligence (AI), blockchain, and augmented and virtual reality (AR and VR) and will further boost data supply and demand, moving the world closer to becoming a truly digital society.

The exponential growth and rapid evolution of new digital and data technologies and related applications will unquestionably affect the public sector. Conventional government data sources include censuses, surveys and administrative data, and while those have served administrators well, the future of data holds virtually unlimited promise. Big data, social media, analytics and a wide range of digital technologies can be leveraged to develop cost-effective, time-saving policy solutions

Photo credit: pixabay.com

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in all development sectors, including health care, employment, production, public transport, water management, corruption prevention, regulatory oversight, public safety and security, climate change adaptation and resource management.

The proliferation of digital technology and data is moving the world in a positive direction, but it also comes with a whole host of risks and challenges. Security, privacy and ethical issues are major concerns, and digital and data literacy and related institutional capacities remain insufficient in many areas, especially in developing countries, transition economies and countries in special situations. With the exponential increase in government data and the growing awareness of its enormous potential and attendant challenges, the need for effective data governance and institutions has gained new urgency. Governments are not only among the largest producers and consumers of data in many countries, but they also play a critical role in data regulation.

This chapter starts with a mapping of government data as a key resource for e-government. The 2020 Member States Questionnaires (MSQs) and Online Services Index (OSI) results are then analysed with a view to evaluating policy and institutional trends around government data. After examining some global issues of concern (data security and privacy and limited data literacy and capacities), the chapter concludes with a proposed approach to the creation of country-level data governance frameworks supported by data strategies and data ecosystems.

6.1.1 Mapping government data

The progress made in e-government development, measured through the United Nations E-Government Development Index (EGDI) since its inception in 2003, is evidence of the global prominence of government data. The routine daily interactions between people and government are constantly translated into government data in a multitude of ways; examples include filling out online forms, clicking links in government portals, transacting e-services, interacting with online chatbots, and accessing public spaces that use surveillance sensors. Public policies and governance in all sectors activate the generation of data that can in turn be used as inputs to contribute to better policy outcomes.

Various terms are used for government data; they may be general or specific and are very often used in a non-exhaustive and non-exclusive manner. Among those most commonly used are public data, government data, census and survey data, administrative data, open government data, big data, geospatial data and real-time data. Some of these terms have been used synonymously in different contexts by different countries and in different literature. Strictly speaking, however, there are some subtle differences, as shown in table 6.1. There are also some intersecting and overlapping relationships; figure 6.1 illustrates such overlaps for big data, open data and government data in the public domain. The present chapter focuses on government data, on big data in the public domain generally, and on open government data specifically.

Increasingly, Governments are integrating unconventional data sources such as big data, real-time data and geospatial data in their operations. According to the 2020 United Nations E-Government Survey (hereinafter referred to as the 2020 Survey), more than 92 per cent of the countries assessed (177) use some type of social networking tool in their portals, and the number of countries that use chatbots (AI-enabled chat applications) in their national portals doubled from 28 in 2018 to 59 in 2020. Fifty-three per cent of Member States (122 countries) also provide geospatial open data through their national portals or data portals.

The general perception, supported by academic research, is that such new data sources will not only enhance public sector productivity and provide more insight in policymaking, but will also

Figure 6.1 The relationship between government data, open data and big data for Governments

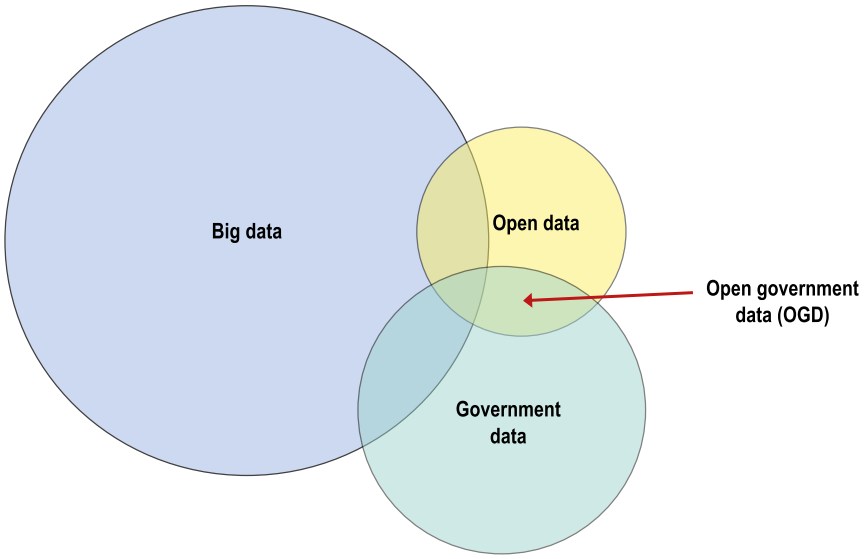


Table 6.1 Terminology related to government data

Data type	Description
Public data	Includes all data that are available in the public domain, including those created by Governments, academia (scientific data, for example), civil society and the private sector.
Government data	A subset of public data "recorded and documented in any manner and on any medium and … obtained or created upon performance of public duties provided by law or legislation issued on the basis thereof" (see figure 6.1).[a]
Census and survey data	Data collected through observation for a given population or universe, including demographic data and other survey data on items such as housing, land use, agriculture and business.[b]
Administrative data	Data collected by government agencies on their operations; includes data on public service transactions in sectors such as health, social services, justice and education. Administrative data sources are data sets created primarily for administrative purposes by government agencies or other entities working on behalf of the Government. Administrative data sources include administrative registers of persons and legal entities and the records of ministries, departments and specialized agencies, including tax returns, social services records and customs data. Regional and local administrations constitute another source of administrative data.[c]
Open government data (OGD)	Data open to and available in the public domain in various (including machine-readable) formats and normally licensed for all to access, use, modify and share;[d] essentially, all OGD are government data, but not all government data are OGD.

Sources: Compiled by author; adapted from various sources, including

(a) Estonia, Riigi, Teataja, Public Information Act, para. 3.1, available at https://www.riigiteataja.ee/en/eli/518012016001/consolide;

(b) United Nations Statistics Division, available at https://unstats.un.org/unsd/demographic/sources/census/wphc/dataCapture/index.htm;

(c) United Nations, *United Nations National Quality Assurance Frameworks Manual for Official Statistics, Including Recommendations, the Framework and Implementation Guidance*, Sales No. E.20.XVII.4 (New York, 2019), para. 7.4(b), available at https://unstats.un.org/unsd/methodology/dataquality/references/1902216-UNNQAFManual-WEB.pdf;

(d) opengovdata.org, "The annotated 8 principles of open government data", available at https://opengovdata.org/;

(e) Connie L. McNeely and Jong-on Hahm, "The big (data) bang: policy, prospects, and challenges", Review of Policy Research, vol. 31, No. 4 (July 2014), pp. 304-310; see also Cassidy R. Sugimoto, Hamid R. Ekbia and Michael Mattioli, eds., Big Data Is Not a Monolith, Information Policy series (Cambridge, Massachusetts, MIT Press, 2016); and

(f) American Association for Public Opinion Research, AAPOR Report on Big Data, AAPOR Big Data Task Force (12 February 2015), p. 5, available at http://doku.iab.de/grauepap/2015/BigDataTaskForceReport_FINAL_2_12_15.pdf.

Note: The terms listed in the table are non-exhaustive and non-comprehensive, and there are intersecting and overlapping relationships among them.

Table 6.1 Terminology related to government data

Data type	Description
Big data	Usually associated with high velocity, volume and variety; often defined within political and social contexts as "a cluster or assemblage of data-related ideas, resources, and practices.";[e] also referred to as an "imprecise description of a rich and complicated set of characteristics, practices, techniques, ethical issues and outcomes all associated with data".[f] Big data analytics can be used for deeper and more complex tasks such as social media sentiment analysis. According to the 2020 MSQs, 60 out of 138 countries indicate that they have incorporated some type of big data strategy in their digital government development.
Geospatial data	Data and information that have an implicit or explicit association with a geographical location.
Real-time data	Constant streams of live data delivered immediately after collection; such data show the actions of Governments and/or people almost instantaneously and are usually deployed with the anticipation of change and the expectation of a rapid response. One example of how such data drive government decisions is the monitoring and analysis of Twitter feeds to understand the movements (or migration) of particular populations within a country in order to anticipate and plan for e-service needs at the subnational level.

Sources: Compiled by author; adapted from various sources, including

(a) Estonia, Riigi, Teataja, Public Information Act, para. 3.1, available at https://www.riigiteataja.ee/en/eli/518012016001/consolide;

(b) United Nations Statistics Division, available at https://unstats.un.org/unsd/demographic/sources/census/wphc/dataCapture/index.htm;

(c) United Nations, *United Nations National Quality Assurance Frameworks Manual for Official Statistics, Including Recommendations, the Framework and Implementation Guidance*, Sales No. E.20.XVII.4 (New York, 2019), para. 7.4(b), available at https://unstats.un.org/unsd/methodology/dataquality/references/1902216-UNNQAFManual-WEB.pdf;

(d) opengovdata.org, "The annotated 8 principles of open government data", available at https://opengovdata.org/;

(e) Connie L. McNeely and Jong-on Hahm, "The big (data) bang: policy, prospects, and challenges", Review of Policy Research, vol. 31, No. 4 (July 2014), pp. 304-310; see also Cassidy R. Sugimoto, Hamid R. Ekbia and Michael Mattioli, eds., Big Data Is Not a Monolith, Information Policy series (Cambridge, Massachusetts, MIT Press, 2016); and

(f) American Association for Public Opinion Research, AAPOR Report on Big Data, AAPOR Big Data Task Force (12 February 2015), p. 5, available at http://doku.iab.de/grauepap/2015/BigDataTaskForceReport_FINAL_2_12_15.pdf.

Note: The terms listed in the table are non-exhaustive and non-comprehensive, and there are intersecting and overlapping relationships among them.

enhance transparency and traceability and allow a better understanding of people's views, needs and experiences. The pairing of government data with data science has enabled agencies to work through massive amounts of real-time and historical data to discern unobvious or unseen patterns and discover anomalies. This can create opportunities for Governments to reform existing systems and functions and deliver new services in ways that were unimaginable a decade ago.[7] For instance, the availability of big data enables analysts to study the tails of a distribution, including outliers, in a way that is not possible with small data. Interest in people's behaviour is often driven by the tails of a distribution (the health-care needs of and service delivery costs for vulnerable groups would be an example). The United Nations Statistical Commission has affirmed "that the use of big data and other new data sources is essential for the modernization of national statistical institutions".[8]

6.2 Policy and institutional trends around government data

Data serve diverse needs in government agencies; they are used for reporting, decision-making, monitoring, and evaluation and make it possible for public administrators to meet legal, compliance and risk management requirements. At a more fundamental level, data enable work processes across business units and provide access to vital public information. The evolution of data technologies and applications is benefiting the public sector in a number of ways, but it is also creating concerns around the issue of public trust. There is both a direct and an indirect relationship between government data and public trust, and the way data-related issues are handled can impact the trustworthiness of the Government as a whole. The solution to bridging gaps in public trust lies not in the data per se but

in data governance guided by the principles of openness, inclusiveness, accountability, competence and consistency.

At the eighteenth session of the United Nations Committee of Experts on Public Administration, within the framework of identifying prospects and recommended actions for advancing the implementation of Sustainable Development Goal (SDG) 16 at the national and subnational levels, the Committee revisited the principles of effective governance for sustainable development endorsed earlier by the Economic and Social Council.[9] A set of commonly used operationalization strategies had been elaborated when the principles were first articulated in 2018, and the Committee worked on further elaborating those strategies during the eighteenth session in 2019; it was also acknowledged that effective operationalization would entail continued efforts in this area going forward and that further evidence was needed of what worked and did not work and under which circumstances. Some of the operationalization strategies relate directly or indirectly to data strategies and related policies and could be applied as proxies to measure the relevance of data policies (see table 6.2). A number of these strategies are already being incorporated in emerging data policies, as shown in the next section of this chapter.

Table 6.2 The principles of effective governance for sustainable development endorsed by the Economic and Social Council: operationalization strategies and their relevance to data governance

	Commonly used strategies to operationalize the principles	
Essential elements and related principles	Direct relation to data governance, strategies or policies	Indirect relation to data governance, strategies or policies
Effectiveness: competence, sound policymaking, collaboration	• Data sharing • Investment in e-government • Strengthening national statistical systems • Monitoring and evaluation systems	• Strategic planning and foresight • Results-based management • Performance management • Financial management and control • Risk management frameworks • Science-policy interface • Network-based governance
Accountability: integrity, transparency, independent oversight	• Proactive disclosure of information • Open government data • Registries of beneficial ownership • Lobby registries	• Budget transparency • Independent audit
Inclusiveness: leaving no one behind, non-discrimination, participation, subsidiarity, intergenerational equity	• Data disaggregation • Universal birth registration	• Accessibility standards • Participatory budgeting • Multilevel governance • Strengthening urban governance • Long-term territorial planning and spatial development

Source: United Nations, Economic and Social Council, "Relating the principles of effective governance for sustainable development to practices and results: note by the Secretariat", E/C.16/2019/4 (23 January 2019), annex, available at https://undocs.org/en/E/C.16/2019/4.

6.2.1 Data as a key resource

The potential impact of government data on the economy and society can be difficult to predict. Defined generally as "facts and statistics collected together for reference or analysis", data exist to serve a purpose.[10] The economic and societal benefits of government data can only be activated and maximized when the data are made available among agencies and to the public through sharing, linked or open formats or through some form of data service or data exchange platform (see section

6.2.2). Evidence has shown that exploiting public sector data can reduce administrative costs. It has been estimated that among the 23 largest Governments in Europe, optimum use of data and analytics would result in potential savings of 15 to 20 per cent—equivalent to between €150 billion and €300 billion.[11]

The Government is one of the principal producers and collectors of data in a wide range of domains, and its vast data holdings constitute a valuable resource that can be used by stakeholders for a multitude of purposes—including the creation of public value.[12] With their burgeoning volume, variety, velocity and value, data are sometimes referred to as "oil" or "gold", reflecting the growing perception that data represent the fuel or currency for e-government and even for government more generally. It is evident that data are now seen as a key resource or strategic asset for the deployment of digital government. Some countries have taken bold steps to expand the role of government data in operations and decision-making; in such contexts, data constitute a central input and output and are used to steer and inform policy options and entire policy cycles—from agenda setting and policy formulation to policy implementation and evaluation. The broader and more robust use of government data can play a catalytic role in transforming institutions and strengthening services provision and engagement with the public. Many Governments see data as a key resource, but their perceptions of the role of data vary widely. Table 6.3 shows the different approaches countries take and reflects a progression of sorts, illustrating how government data are increasingly leveraged for effective governance.

Table 6.3 Data as a key resource for Governments: varied approaches among countries

Approach	Description
ICT-driven	Where Governments are highly influenced by the use of new and existing information and communications technology (ICT).
Data-informed	Where Governments are guided by data; data play an inferential role in policymaking, with the understanding that data will inform rather than drive decision-making because there are rational, political and moral elements of decision-making and data are just one important aspect of the process.[a]
Data-driven	Where Governments use analytics and algorithms in decision-making (elaborated in a recent OECD working paper on a data-driven public sector).[b]
Evidence-based	Where policy approaches reflect the practical application of the findings of the best and most current research available (the Foundations of Evidence-Based Policymaking Act in the United States is highlighted in box 6.2).
Data-centric	Where Governments place data and data science at the core of public administration; data are seen as a key asset and central to government functions and are leveraged for the provision, evaluation and modification of people-centric services.[c]

Source: Compiled by author; adapted from various sources, including

(a) Jianping Shen and others, "Data-informed decision making on high-impact strategies: developing and validating an instrument for principals", The Journal of Experimental Education, vol. 80, No. 1 (2012), pp. 1-25;

(b) Charlotte van Ooijen, Barbara Ubaldi and Benjamin Welby, "A data-driven public sector: enabling the strategic use of data for productive, inclusive and trustworthy governance", OECD Working Papers on Public Governance, No. 33, GOV/PGC/EGOV(2019)3 (Paris, Organization for Economic Cooperation and Development, 2019), available at https://www.oecd-ilibrary.org/governance/a-data-driven-public-sector_09ab162c-en; and

(c) Andrea Di Maio, "Moving toward data-centric government" (Stamford, Connecticut, Gartner, published 18 March 2013; refreshed 8 August 2014), available at https://dublinohiousa.gov/dev/dev/wp-content/uploads/2016/02/moving_toward_datacentric_go_248186.pdf.

The semantic definitions highlighted in the table are useful in terms of framing the importance of government data in different contexts, but as noted above, these approaches also represent the progressive recognition of the centrality of data in public institutions. Arguably, placing data at the core of public governance and the delivery of people-centric services leads to data-centric

government, with the underlying notion that data are both key inputs and key outputs for any institution. In practical terms, data make it possible for institutions to anchor fiscal and strategic plans to objective facts and empirical evidence. Data also strengthen the capacity of institutions to fulfil their mandates, create public value, and contribute to the public good. Interestingly, the availability and effective use of government data can also change the way policymakers think about measuring and interpreting public needs, expectations and behaviour.[13] It is important to recognize that government data will play an increasingly important role in public sector efforts to respond to the ever-expanding complexities of modern society.

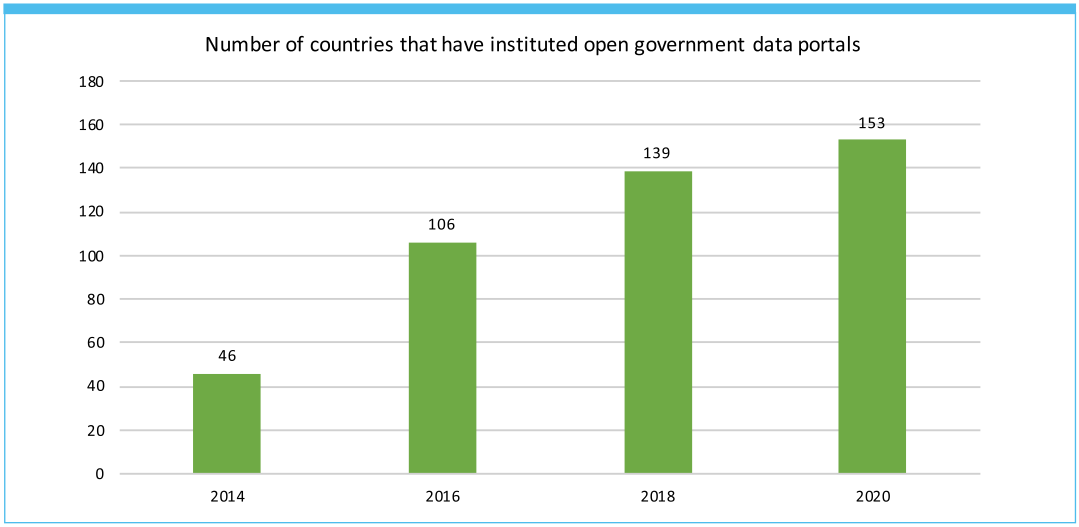
6.2.2 Open government data and access among individuals and businesses

Since 2014, the Survey has documented development trends relating to open government data (OGD). As illustrated in figure 6.2a, the number of countries with OGD portals jumped from 46 in 2014 (24 per cent) to 153 in 2020 (80 per cent). There have also been increases in associated features; among the Member States surveyed, 59 per cent have an OGD policy, 62 per cent have metadata or a data dictionary, 57 per cent accept public requests for new data sets, 52 per cent offer guidance on using OGD, and 49 per cent engage in promotional efforts (such as data hackathons) (see figure 6.2b). It is interesting to note that only 114 of the 153 countries with OGD portals have an OGD policy in place.

Trends in OGD performance are reflected in the Open Government Development Index (OGDI). The most recent results show marginal progress between 2018 and 2020; the number of countries with very high OGDI values rose from 34 to 41, and those with low OGDI values declined from 76 to 71 (see figure 6.2c).[14] The annexes show the 2020 OGDI values and levels for all countries.

There are innumerable benefits associated with the release of open government data. The data made available by Governments can stimulate innovation through people-centric analytics and applications, perhaps leading to the provision of services tailored to the needs of particular groups, including vulnerable populations. Providing open data through an online portal can eliminate redundancies and red tape and reduce the time and resources associated with public requests for information.[15] Academics, businesses and members of the general public who avail themselves of open government data sets from various sectors can offer new insights into complex policy issues.[16] Since 2018, the United Nations Statistical Commission has been engaged in deliberations on principles, guidance and support for open data policies and provision; the discussions have focused not only on the practical

Figure 6.2a Open government data (OGD): development trends



application of open data in official statistics, but also on new data needs.[17] The Organization for Economic Cooperation and Development also promotes OGD through the OECD Open, Useful and Re-usable data (OURdata) Index.[18]

Figure 6.2b Open government data (OGD): development trends

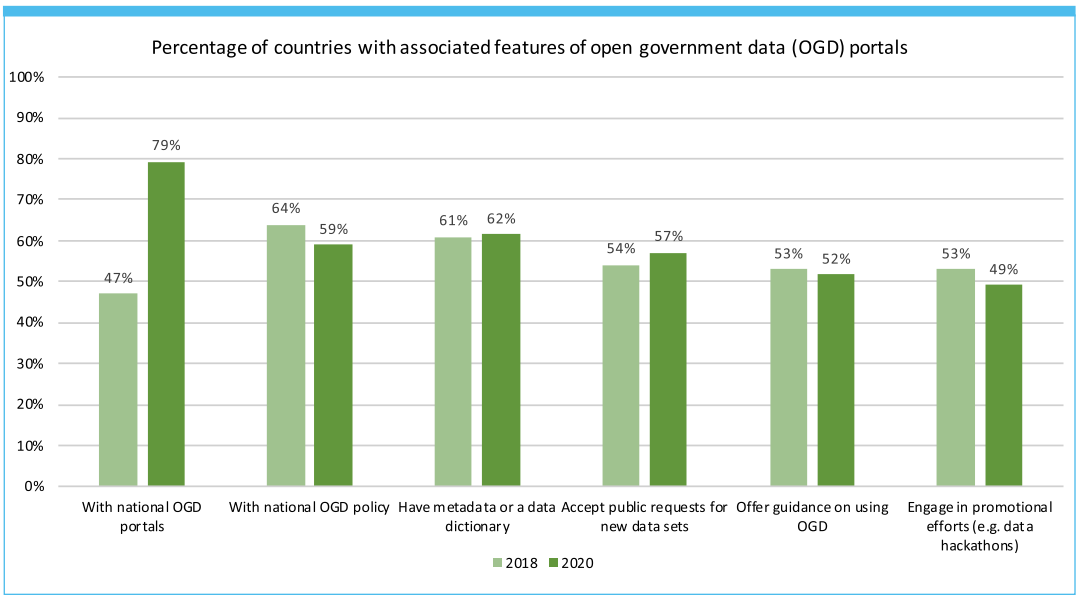
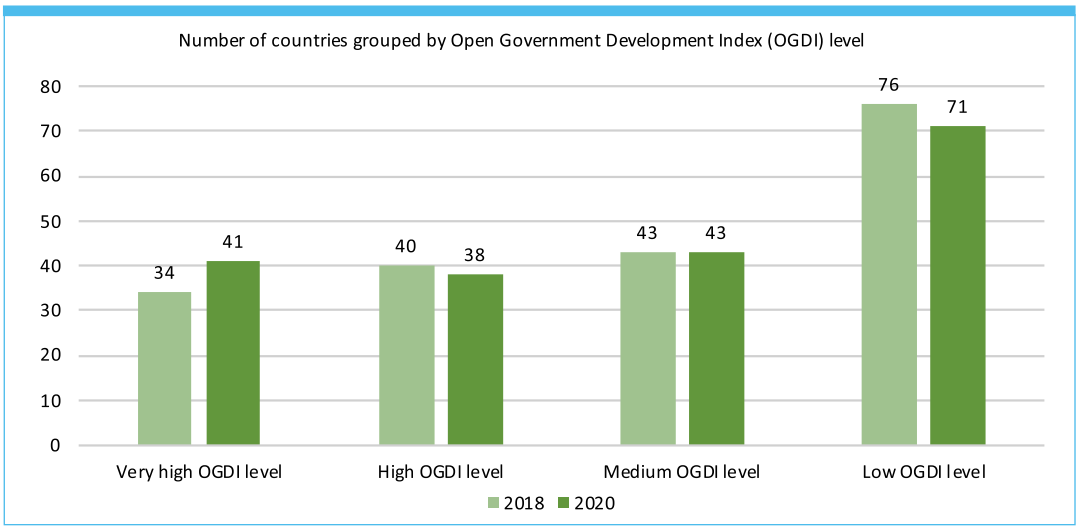
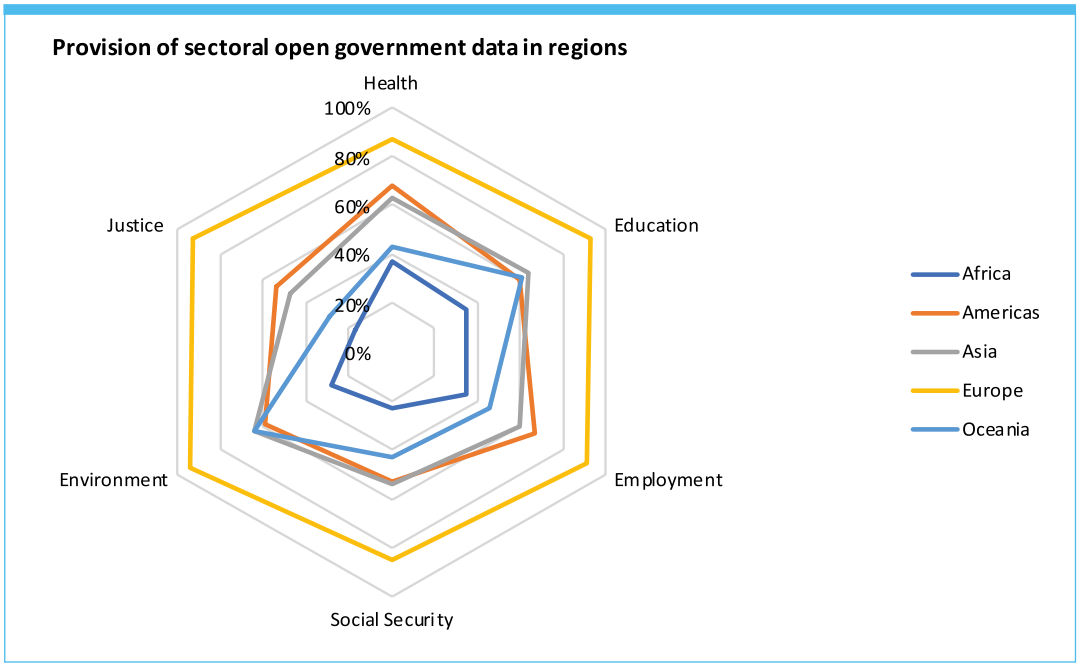


Figure 6.2c Open government data (OGD): development trends



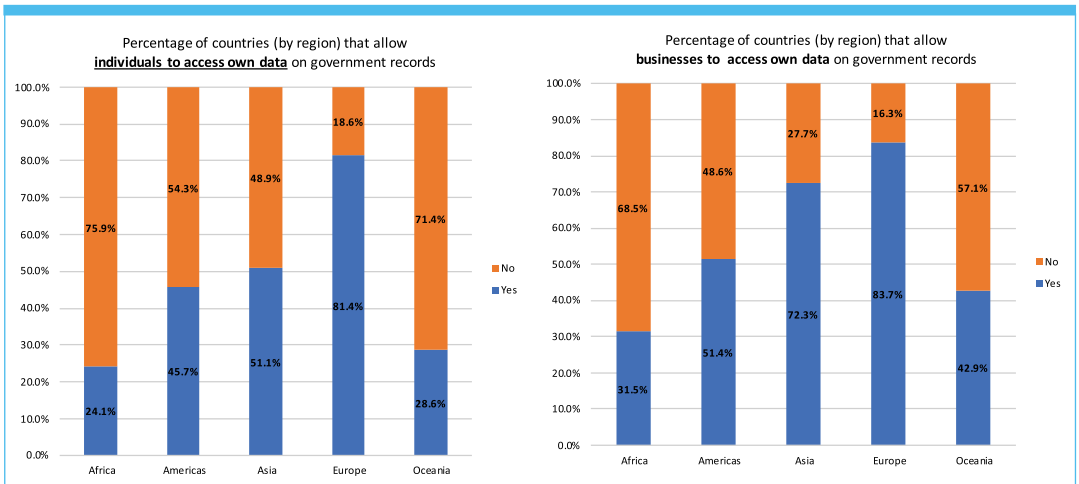
Other potential benefits associated with open data include enhancing transparency and public accountability and promoting public participation in policymaking and problem-solving.[19] Making open data available operationalizes SDG indicator 16.10.2, which relates to enhancing public access to information. A growing number of countries have attached priority to releasing data sets online not only to tap into the participatory potential of open data, but also to open the door to public feedback. This reflects the willingness of Governments to welcome the public use of OGD resources and also to accept public critique, which can help them improve the quality of the data they offer.[20] As shown in figure 6.2d, Europe leads in the provision of OGD in all sectors, while Africa lags behind the other regions, especially in the environment, justice and social security sectors.

Figure 6.2d Open government data (OGD): development trends



One aspect of OGD addressed by the Survey is whether individuals and businesses can access and/or modify their own data. As indicated earlier, more data-adaptive approaches could revolutionize the public sector and place a lot more control in the hands of individuals—for example, by ensuring that everyone has instant access to all the individual information the Government has about them and can make their own decisions about who should be allowed to see that information and how it can be used. The 2020 Survey results for access to own data indicate that while there has been some improvement since 2018, regional percentages for access to individual data vary widely (from 24 to 81 per cent), and Africa and Oceania still have relatively few countries offering access to such data (see figure 6.3). The picture is somewhat better for businesses; as part of the push to support the business sector and local entrepreneurship, more countries across all regions are allowing businesses to access their own data, with regional proportions ranging from 32 per cent in Africa to 84 per cent in Europe.

Figure 6.3 Countries that allow individuals and businesses to access own data



Source: 2020 United Nations E-Government Survey.

Analysing past and present OGD trends could be instructive, but quantitative assessments of a limited number of indicators provide an incomplete picture. Measuring quality and usage would contribute to a more complete picture, as would the addition of more areas for evaluation, including the availability of application programming interfaces (APIs) and open data licences, both of which are essential for the practical and effective use of OGD.

6.2.3 Emerging data policies and practices

An evaluation of the 2020 MSQs and other relevant research findings has revealed some discernible trends related to data policies and practices in the public sector. Evidence of new policy and institutional instruments around data reflects increasing recognition of the heretofore hidden value of data and data science in the public sector. This section provides an overview of pertinent trends and evaluates how data and related policies and practices have evolved recently. What is not included this review (but is increasingly relevant) are policies implemented at the local level, especially those relating to local data. There are ways in which local institutions and communities are empowered by local data, including through edge computing[21] and real-time data; however, there are also resource and capacity challenges that prevent local authorities from benefiting fully from the data revolution.

Data standardization and classification

Data standardization and classification are necessary to ensure the consistency and compatibility of data and data-related processes in the public sector, especially in integrated or whole-of-government contexts. However, enforcing data standardization and classification across specialized and autonomous government agencies in multiple sectors can be a major challenge.

In some countries, a leading ministry or an interministerial commission or committee addresses issues relating to standardization and classification. Statistics New Zealand is the lead agency for government-held data in New Zealand and has guidelines on data standards and a stewardship framework.[22] Colombia[23] and Estonia[24] have adopted relevant legislation that is part of a broader digital government strategy. Norway has a regulation to ensure universal design of ICT solutions, including data schemas, with legal requirements that apply to both public- and private-sector entities.[25] In the Republic of Korea, policies and guidelines focusing on data classification and standardization have been established, enforced and amended over the years to address emerging trends; the country's deliberate effort to ensure continued relevance is reflected in the amendment of the Guidelines for Database Standardization in Public Institutions, established in 2009, to reflect updates introduced in 2019.[26]

Some countries have adopted sectoral approaches to data standardization or have established relevant legal mechanisms governing public-private data partnerships. The European Multi Stakeholder Platform on ICT Standardisation was established "to advise on matters related to the implementation of ICT standardization policies".[27] Japan adopted the Basic Law for the Promotion of Public-Private Data Utilization to facilitate and manage the use of public-private data through infrastructure development and the regulation of public-private participation and cooperation, with consideration given to the division of roles within the Government.[28] This integrated approach facilitates the effective dissemination of public-private data and helps to ensure that all stakeholders maintain agreed-upon standards and adhere to compatibility requirements.

Even when national standardization guidelines are in place, they are not always strictly followed, as different agencies often adapt them to local needs and circumstances. To curb the tendency to deviate from agreed norms and standards, all public entities not part of the central government should be included in the process of developing and/or revising national guidelines; it is recommended that data standards be linked to a set of principles that reflect shared public goals and public values.

Sharing data, linking data, interoperability, and data exchange platforms

In the 2018 edition of the *World Public Sector Report*,[29] which highlights the political salience of mainstreaming integrated approaches to sustainable development, it is emphasized that data constitute a key cross-cutting enabler of policy integration. There is enormous potential for enhanced efficiency through digitalization and the optimization of processes for exchanging data and information among administrative entities; however, action must be taken in a number of areas before this can be achieved.

The collection and use of timely, high-quality data remain a challenge in many countries, especially in lower-income countries, where resources are scarce. Coordination issues represent another concern. One of the problems preventing or undermining interoperability in government systems is the lack of cohesion in the way data are shared and managed. At the horizontal level, one of the options Governments could explore is combining and sharing data about an individual from several systems across agencies to gain a better overall picture of the individual. This sort of approach would allow Governments to provide e-services using a life events approach.[30] However, it might also lead to a level of public surveillance that is perceived as an invasion of personal privacy (see section 6.3.2). Comprehensive interoperability would have a transformative impact in a number of areas, from the way Governments monitor the effects of specific initiatives to the way they deliver services to the public. To benefit from this, different government departments would have to set up effective collaboration mechanisms for data exchange, which could prove challenging in large government bureaucracies. Table 6.4 highlights some common approaches to publishing, sharing, linking and exchanging data across government agencies (both horizontally and vertically) and strengthening the interoperability of government data systems.

Many countries have expressed interest in embracing the principles that underpin interoperability and have even adopted relevant policy initiatives. Highlighting positive trends—by spotlighting leading-edge data interoperability policies and the guiding principles behind demonstrated successes—has proven conducive to advancing interoperability efforts among different agencies and stakeholders. Governments have approached interoperability in various ways. A number of countries have long enforced specific technical requirements and standards to establish or improve interoperability, some countries have adopted policies on interoperability (including laws, codes, decrees or guidelines, as shown in table 6.4), and others have taken concrete steps to implement relevant institutional reforms or formalize new arrangements. The Government of Australia, for example, through its 2018 legislation on new data governance arrangements, has made it mandatory for all government agencies to use open standards for interoperability.

There are various options for sharing, linking or exchanging data through platforms that offer advanced digital services, such as data APIs, data services or data markets. For such platforms, integration is key, and connectivity is critical. The ability to integrate across multiple systems, including legacy systems, is also required, as is the application of data- or user-centric policies such as the once-only principle for data provision.[31] A review of the 2020 MSQs indicates that more than 60 per cent of the countries supplying relevant responses (91 of 148) have put such policies in place.

Some Governments have established interoperability standards for specific data-centric platforms, such as payment systems. In Kenya, for instance, the National Payment System Act requires all service providers to use systems capable of interoperability with other payment systems in the country and internationally.[32] The Ministry of Health in Bangladesh has undertaken an initiative to develop e-health data standards and an interoperability framework for the database systems that have been or will be developed, benefiting not just the Ministry and other government agencies but also development partners, the private sector and civil society organizations.

Table 6.4 Different approaches to sharing, linking and exchanging data and strengthening interoperability

Approaches	Description	Examples and other illustrations
Open government data	Publishing open government data that are accessible internally within the Government and externally to the general public.	See section 6.2.2.
Linked data	Linked data is a technical standard for structuring complex information and relating and linking independent sets of data from different sources; used for launching linked open government data portals to connect isolated data repositories (data silos).[a]	The Administrative Data Research Network in the United Kingdom has created a number of "safe havens" where administrative data can be anonymized and linked, with strict controls over who has access to the data and for how long.[b]
Data sharing	Sharing government data in accordance with guidelines, policies or other instruments that govern data formats and dictate data management, retention, security and privacy rules.	An example is the Data Sharing and Governance Act 2019 in Ireland.[c]
Interoperability	Enabling systems and devices to exchange machine-readable data from multiple sources in a standardized and contextualized way and to interpret shared data. Standards are essential for data interoperability, as they allow different system components to be integrated seamlessly without any loss of meaning or integrity.	Argentina[d] has an interoperability framework; Mexico,[e] Uruguay,[f] Brazil,[g] Peru,[h] and Argentina[d] have interoperability acts/decrees; the National Digital Interoperability Regulation in Portugal covers the adoption of open standards in State computer systems;[i] and the three-part Philippine eGovernment Interoperability Framework (PeGIF) addresses the technical aspects and standards of interoperability, information interoperability, and exchange and business process interoperability.
Data exchange	Often a combination of two or more of the elements listed above; platforms that provide two-way data exchange through application programming interfaces (APIs), data exchange portals or centralized data services.	The data exchange platform in Estonia (X-Road) is administrated centrally to interconnect government information systems and databases and allow government authorities and citizens to securely send and receive information over the Internet within the limits of their authority.[j] In the United States, the National Information Exchange Model—a "common vocabulary that enables efficient information exchange across diverse public and private organizations"—has been used for integrated applications such as the Disaster Assistance Improvement Programme, which provides "a single access point for more than 40 federally funded forms of assistance".[k]

Source: Compiled by the author from multiple sources, including

(a) Bizer, C., Heath, T. and Berners-Lee, T., "Linked data – the story so far", International Journal on Semantic Web and Information Systems, Vol. 5 No. 3, pp. 1-22 (2009);

(b) Cat Drew, "Data science ethics in government, Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, vol. 374, No. 2083 (2016), available at http://doi.org/10.1098/rsta.2016.0119;

(c) Irish Statute Book, Data Sharing and Governance Act 2019, available at http://www.irishstatutebook.ie/eli/2019/act/5/enacted/en/html;

(d) InfoLEG, Ministerio de Justicia y Derechos Humanos de Argentina, Administración Pública Nacional Decreto 1273/2016, Simplificación Registral, available at http://servicios.infoleg.gob.ar/infolegInternet/anexos/265000-269999/269242/norma.htm;

(e) Diario Oficial de la Federación, Agreement establishing the Interoperability and Open Data Scheme of the Federal Public Administration (2011), available at http://dof.gob.mx/nota_detalle.php?codigo=5208001&fecha=06/09/2011;

(f) IMPO, Centro de Información Oficial Decreto N° 178/013 (2020), available at http://www.impo.com.uy/bases/decretos/178-2013;

(g) Presidência da República Secretaria-Geral Subchefia para Assuntos Jurídicos, Decreto N° 8.789, de 29 de Junho de 2016, available at http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2016/Decreto/D8789.htm;

(h) Gobierno del Perú, Decreto Supremo N° 083-2011-PCM (2011), available at https://www.gob.pe/institucion/pcm/normas-legales/292465-083-2011-pcm;

(i) Diário da República Eletrónico, Resolução do Conselho de Ministros N° 2/2018, available at https://dre.pt/pesquisa/-/search/114457664/details/maximized;

(j) Nordic Institute for Interoperability Solutions, "X-Road: the free and open source data exchange later software", available at https://x-road.global/xroad-introduction; and

(k) National Information Exchange Model, available at http://niem.github.io/ and https://www.niem.gov/about-niem/success-stories/disaster-assistance-improvement-program-daip-program-management-office.

Note on linked data: The necessary mechanisms are specified in the Resource Description Framework (RDF) (see RDF Syntax, www.w3.org/TR/REC-rdf-syntax/), which defines a language for representing information as linked data. Such linked data consist of nodes and directed arcs linking pairs of nodes; a subject node, predicate node and object node form a so-called RDF triple.

Inter-agency and inter-level government data sharing, linking and exchange can increase public sector productivity, improve services, reduce data requests, strengthen evidence-based policymaking and the integration of public services, and facilitate a whole-of-government or whole-of-society response to public needs and emergencies. New data applications are created and deployed on an ongoing basis, so it is essential that modern, open and adaptable platforms be put in place to facilitate interoperability. The State Council of China has issued Interim Measures for the Administration of Government Information Resources Sharing, one of the key components of which is the establishment of effective management mechanisms for sharing government data. Shanghai—a large city and one of the leaders in local e-government development (see chapter 4)—has implemented not only an integrated big data policy but also supporting institutional mechanisms (see box 6.1).

Box 6.1 The data-centric online-offline integration of digital government in Shanghai

The sharing, exchange and integration of data across government agencies are often inadequate and challenging. There are readiness gaps among different agencies and a lack of incentives.

Shanghai is the largest city in China, and the resource requirements for providing more than 24 million residents with access to public services are enormous. In order to streamline operations and enhance public services provision, the municipal government has adopted an innovative approach to facilitate the sharing of data across government departments and agencies based on demand and usage. The initiative derives its mandate from the newly enacted Shanghai public data governance and online-offline integrated services policy.

The Shanghai Municipal Big Data Center was established by the city government in 2018 as a one-stop-shop service platform for "cross-level, cross-department, cross-system and cross-service data sharing and exchange for government, industry and social data". The Center is designed to support the data ecosystem, primarily through data governance and coordination. It is tasked with promoting the integration of technology, business and data and helping to build a data-sharing system for the city; it is also responsible for formulating technical standards and developing management approaches "for the collection, management, sharing, opening, application and security of data resources". On the ground, it facilitates the sharing and exchange of data between multiple levels of government and between the Government and users and is engaged in the analysis and application of different types of public data, including geospatial and real-time data, in support of operational and people-centric e-services. More than 1,000 e-services—with a foundation of more than 16,000 data resources and 14 billion data points across 50 agencies—are available through the Big Data Center, which is hosted in the dedicated e-government cloud. In 2019, there were around 540 million data requests (both push and pull). There are substantial operational and maintenance costs attached to the Center; however, the services it provides contribute enormously to enhancing digital government, improving the business environment, and improving the quality of life of all Shanghai residents.

As part of Big Data Center operations, a suite of integrated online-offline government services was launched via mobile services (through WeChat and other apps). More than 13 million users are currently registered on the portal and can access e-services anytime and anywhere. Integrated into the online portal is access to over 200 physical government service centres with more than 20,000 employees to help people with offline service requests. The integrated online-offline system offers a one-stop-for-all-services approach that allows users to complete all tasks and processes in a single visit. This is especially convenient for vulnerable groups such as older people, the unemployed, and pregnant women, who often have special needs or requests. In the first half of 2019, the offline service centres in Shanghai received 36.45 million visitors.

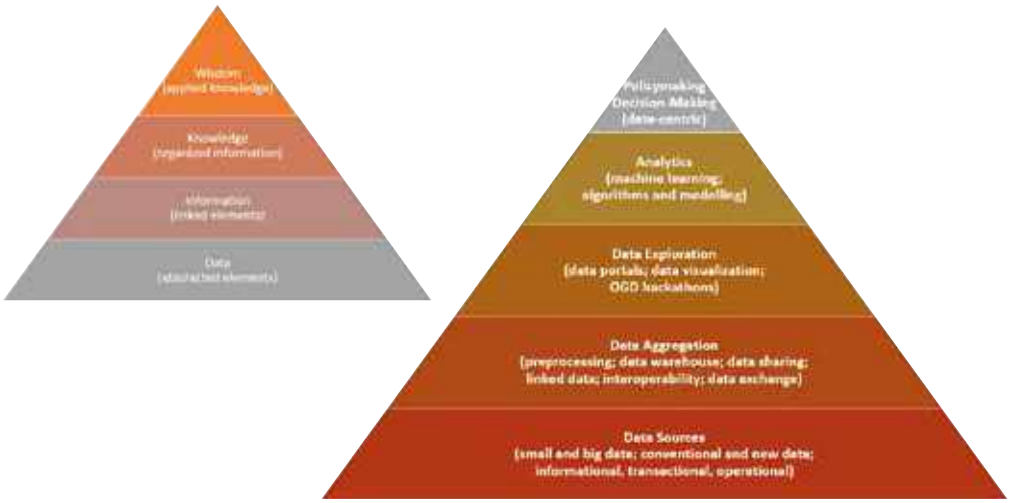
Sources: Submitted in response to a request for inputs initiated by UN DESA; see the United Nations E-Government Surveys web page, available at https://publicadministration.un.org/en/Research/UN-e-Government-Surveys (accessed 13 February 2020). Additional information (including quoted material) obtained from Huang Yixuan, "Big Data center launched to drive smart Shanghai", ShanghaiDaily.com (13 April 2018), available at https://archive.shine.cn/business/it/Big-Data-center-launched-to-drive-smart-Shanghai/shdaily.shtml

There are both direct and indirect benefits associated with the sharing of government data. Arguably, the laborious act of collaborating through data sharing, linking or interoperability may seem to deliver low return on investment; but the value lies in the intrinsic benefits such collaboration is presumed to produce. Establishing cross-agency collaboration in data initiatives may therefore require more of a focus on the expected benefits that are people-centric. When agencies are required to review their data and ensure that they are in the appropriate form for release, they are also forced to evaluate the status and quality of their data and to take stock of the data they have in their possession. This often leads to improved data quality within organizations. In addition to this intra-organizational benefit, sharing data encourages communication and partnerships across agencies and sectoral boundaries.

Evidence-based policymaking

As illustrated by the well-researched data-knowledge-information-wisdom paradigm shown in figure 6.4, data are not evidence unless they are used to address specific questions in a given context.[33] Evidence is what decision makers really seek, but data are not evidence until they have been through an interpretive sieve.[34] There is, by default, a unidirectional flow of logic from data to information to knowledge to evidence. The right pyramid in figure 6.4 illustrates how data are leveraged in increasingly sophisticated ways (from aggregation to exploration and analytics) and can eventually be deployed for data-centric policymaking and decision-making. Data help decision makers obtain the evidence they need, but data are not information unless structures or patterns can be detected in them, and information is not knowledge unless those patterns have been verified by statistical analysis and their implications understood; these processes are now better enabled through the increased availability of proven data technologies.

Figure 6.4 The role of government data in evidence-building and policymaking

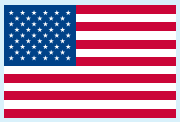


Source: Adapted from John D. Kelleher and Brendan Tierney, *Data Science* (MIT Press Essential Knowledge series, 2018).

The need for data-centric insights to inform decision-making and policymaking is as evident today as it was when the notion was first conceived decades ago. However, the lack of data and related technologies and competencies has constituted a barrier to progress in this area. The situation has changed to a certain degree in recent years with the emergence of embedded analytics and self-service-analytics powered by evolved data technologies, including simplified data management, consolidated platforms that integrate critical capabilities, and new means of enabling analysis at scale.[35] With the availability of data and the application of data science, data-centric decisions can be made by policymakers who are non-technical analysts or specialists. In the United States, for

example, State Emergency Response Commissions have access to a dynamic, interactive visualization tool that allows non-specialists to coordinate responses to emergencies.[36] Regulations and guidelines are essential for transforming evidence-based policymaking into concrete action, as not every policymaker has the same set of perceptions of how data contribute to knowledge and evidence. The United States adopted the innovative Foundations for Evidence-Based Policymaking Act of 2018 in order to promote better data management, evidence-building and statistical efficiency (see box 6.2).

Box 6.2 United States: Foundations for Evidence-Based Policymaking Act of 2018



While evidence-based policymaking is not new and is widely supported by academic research, it is still uncommon to find a national policy or strategy supporting this approach.

In 2016, the United States Commission on Evidence-Based Policymaking was created to explore ways in which the Government could make better use of its data to inform future government decisions. The Commission spent a year and a half in deliberations and fact-finding and in September 2017 issued a report in which priority was assigned to expanding access to data, ensuring privacy, and strengthening the capacity of the Government to generate and utilize evidence to evaluate budgetary spending on programmes affecting health, education and economic well-being.

The Foundations for Evidence-Based Policymaking Act (the Evidence Act) received congressional approval in 2017 and 2018 and was signed into law by the President in January 2019 to facilitate the implementation of a number of the Commission's recommendations. Shortly thereafter, the Federal Data Strategy was issued by the White House Office of Management and Budget (OMB) as a second implementation mechanism, identifying data as a strategic asset and outlining the principles and practices to which federal agencies would have to adhere in the execution of the Act. The OMB published multiple guidance documents to help agencies address some of the Commission's recommendations; included in the documents were provisions for designating evaluation officers, appointing chief data officers, identifying statistical experts, developing "learning agendas", and incorporating new actions into annual budget and performance plans. For agencies that already have data strategies in place, such as the Department of Health and Human Services, the Evidence Act constitutes an additional mandate to strengthen capacity for using data for evidence-building purposes.

The Evidence Act establishes new expectations for open data, data inventories, and data management. It also reinforces the longstanding Confidential Information Protection and Statistical Efficiency Act, a strong privacy and confidentially law that compels the Government to take all necessary steps to protect data when confidentiality has been promised. A national secure data service (recommended by the Commission but not yet established) is expected to improve data access and will also strengthen privacy protection.

Sources: United States, Foundations for Evidence-Based Policymaking Act of 2018, H.R. 4174 - 115th Congress (2017-2018), available at https://www.congress.gov/bill/115th-congress/house-bill/4174; see also J. Heckman, "Federal Data Strategy to impact all feds, not just 'data plans for data wonks'", *Federal News Network* (2020), available at https://strategy.data.gov/; and Data Coalition (2020), available at https://www.datacoalition.org/two-years-of-progress-on-evidence-based-policymaking-in-the-united-states/.

Data policies for artificial intelligence and other frontier technologies

Another emerging trend is the implementation of data-related policies that empower the use of frontier technologies such as artificial intelligence (AI), machine learning (including deep learning) and blockchain. As the Fourth Industrial Revolution has gained momentum, policies and government discussions around new technologies have increased. Many Governments are looking to harness the potential of a wide array of new technologies. These fast, innovative technologies can be used to match and link together fragments of related data and information quickly and non-persistently; they can improve public services provision by streamlining e-service transactions, reducing the scope for errors, and eliminating the need to request the same information from people multiple times.

Some Governments are engaged in discussions on issues that cut across multiple new technologies at the national level and may also have taken institutional or policy action or adopted national strategies for the integration of new technologies in public administration. Others may be concentrating primarily on one or a small number of promising new technologies; AI is receiving particular attention owing to its distinctive (though sometimes controversial) role in the digital revolution. Canada has issued a directive on AI,[37] while the National Assembly's Special Committee on the 4th Industrial Revolution in the Republic of Korea is focusing on blockchain, AI and big data.[38] The Swiss Federal Council recently published a draft law on blockchain and distributed ledger technology.[39]

6.3 Risks, challenges and gaps in data governance

It would be a misjudgement to focus solely on the benefits attached to the increased availability and applicability of government data and to ignore the relevant risks and challenges. The most common challenges faced within the Government relate to the lack of data leadership, data infrastructure, resources and expertise, and to poor data quality, data gaps, security issues, and country-specific data governance problems. For the general public and non-government actors, the most commonly cited challenges relate to data privacy, ethics, data availability, the technologies behind data applications, and a lack of understanding of data-related policies.

Public institutions are often keen to pursue new data-related opportunities but may be constrained by problems with their data and other externalities. It is essential for Governments to systematically identify existing and potential data risks and challenges so that they can assess possible political and policy pitfalls and develop targeted strategies to address them.[40] When developing data policies and programmes, and especially when attempting to implement more structured and systematic practices, Governments should consider how risks and challenges might affect the processes, expected outputs, and desired outcomes and impacts. Analysing the risks and challenges may also help policymakers and executive-level administrators identify the most urgent areas of need and allow them to prioritize the allocation of scarce resources for data initiatives. The ability to clearly identify both benefits and challenges can also help practitioners communicate the value of exploring or exploiting various assets to senior management (for buy-in) and can guide them in the design and implementation of data initiatives and processes. The objective is to ensure that data projects, programmes and strategies are designed to maximize benefits and minimize risks, with optimal trade-offs made when needed.

6.3.1 Data security

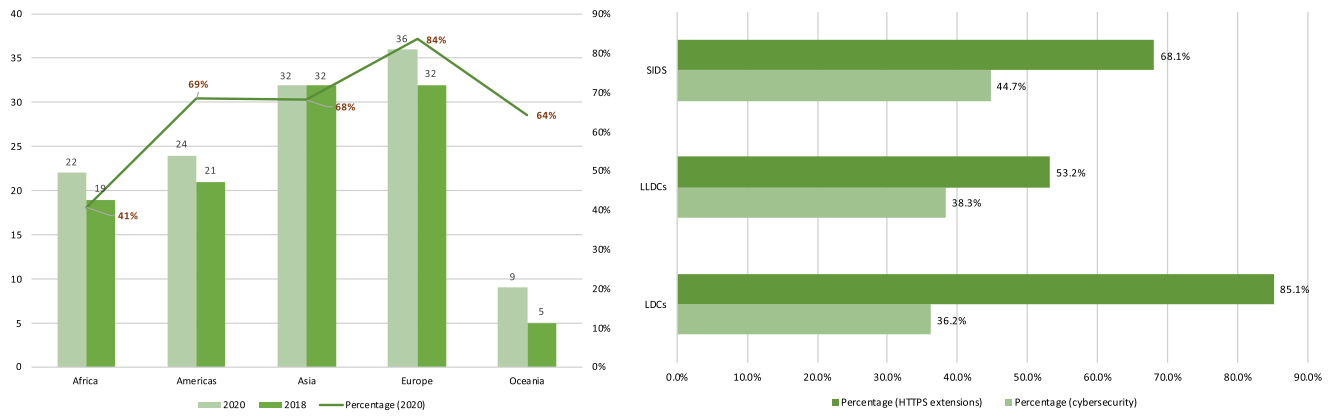
Almost every country has experienced some form of a government data security breach, though this has not always been made public. The number of high-profile cases resulting in consequential economic or social losses is increasing. It is estimated that the average cost of a data security breach in the United States will surpass $150 million in 2020, and the corresponding global figure is estimated at $2.1 trillion.[41] Not only do data breaches impair the effective functioning of institutions and impact the economic well-being of key sectors such as health care and social security, but they also affect the safety and security of people, impose intangible social costs, and undermine public trust in the Government. For example, the health-care sector is a repository for a large amount of sensitive information that needs to be protected for privacy reasons, and the consequences of any hacking incident are typically very serious.

Alongside the growing need for the adoption or amendment of data policies and for the strengthening of institutional capacities and capabilities around data and analytics, there is increasing demand for the enhancement and enforcement of data security and protection provisions. There are justifiable concerns about people's data being lost or stolen, and the Government has a statutory obligation to

protect such data. It is vital that appropriate security measures be put in place to ensure online data security and protection as prerequisites for the use of data to drive sustainable growth and maintain a healthy digital environment.

Figure 6.5 shows that the number of countries with cybersecurity legislation available online increased from 109 in 2018 to 123 in 2020, with the latter figure representing 64 per cent of Member States. There are still 70 countries with no cybersecurity legislation or with no relevant information accessible online, however. While the majority of countries in the Americas, Asia, Europe and Oceania have cybersecurity legislation online, the same is true for only 22 countries (41 per cent) in Africa. Among the three groups of countries in special situations, many (between 53 and 85 per cent) have put extensions of security protocols such as Hypertext Transfer Protocol Secure (HTTPS) in place, but far fewer (36 to 45 per cent) have made cybersecurity legislation available online. It is important to note that national cybersecurity protections address a broad range of concerns, including data security, and that the contextual emphasis of national cybersecurity legislation differs based on national priorities.

Figure 6.5 Regions and country groupings with cybersecurity legislation available online and/or with HTTPS extensions in place



Key: SIDS, small island developing States; LLDCs, landlocked developing countries; LDCs, least developed countries.

Advanced safeguards are critical for government portals, given their increased usage for online services. An awareness of cybersecurity issues and threats, clear incident reporting frameworks, and ongoing staff training are necessary for effective response to data breaches and cyberattacks.[42] Cybersecurity is a top priority for many countries, with Governments focused not only on domestic threats but also on international risks, given the cross-boundary architecture of the Internet. There are a number of global and regional initiatives focused on strengthening cybersecurity. For example, the Best Practice Forum on Cybersecurity set up by the Internet Governance Forum serves as a platform for focused multistakeholder and multidisciplinary discussion on cybersecurity policy challenges, with the discourse intended to inform Internet governance policy debates.[43] The International Telecommunication Union has a cybersecurity programme that offers stakeholders useful tools, critical insights, assessments and technical assistance.[44]

Individuals also have an obligation to contribute to the protection of their personal data online. However, they can only be expected to act responsibly if they understand what is at stake, are aware of the risks, know their rights, and have learned what to do.[45] Developing cybersecurity and broader digital literacy capacities should enable e-government users, including vulnerable groups and minorities, to become more secure online, to demand data security and safety protections, and to defend themselves against threats.[46]

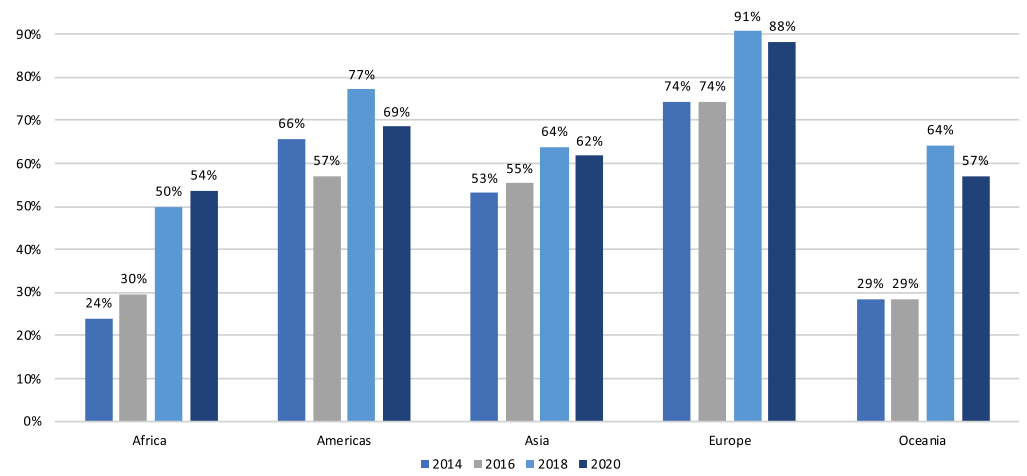
6.3.2 Data privacy and ethics

With the rapid uptake of e-services and the increased use of government data in the public sector, a number of challenging privacy and ethics issues have emerged. Governments need to use large data sets (including identifiable data) to create good algorithmic models for policymaking. However, there are conflicting imperatives characterizing government data use and management; demands for greater accountability in the use of data for government programmes in various sectors must be weighed against concerns that the paternalistic approaches of Governments may lead them to trample on personal privacy. The growing public concern and controversy over the collection and use of public data by Governments has coalesced around a series of high-profile incidents. Registered public concerns relate to issues such as the legitimacy of project objectives, the lack of public awareness, and the lack of clarity around possibilities for opting out of data extraction processes.[47] The use of government data is generally deemed unacceptable when it is perceived as an invasion of privacy.

With the increased production and use of government data, e-government routines, interactions and practices are inextricably (though not always visibly) linked to the privacy of individual and business users.[48] There are issues surrounding not only the proliferation of data collected on the public, but also the profiling and surveillance applications used by the public sector to gather information on the population.[49] Government data use is not always perceived to be serving the public interest. Seeking consent for data use can be complicated, as data ownership is not always clear, and the situation becomes particularly convoluted when data management is shared or transferred between agencies, as this often makes it impossible to assign or trace accountability or attribution.

Many Governments have articulated and publicized privacy policies in an effort to promote transparency. Figure 6.6 reflects a positive trend, indicating that the number of countries with privacy statements available on their e-government portals increased from 97 in 2014 to 128 in 2020. There are differences in the scope, breadth and depth of these statements, but the EGDI methodology does not allow for the measurement of such variables. Roughly a third of the Member States (65 countries) do not have a privacy statement online, even though they may be offering an array of e-services. While a majority of countries in all regions have a privacy statement online, this majority is rather slim in a couple of cases; only 29 of 54 countries (54 per cent) in Africa have online privacy statements, and the same is true for only 8 of 14 countries (57 per cent) in Oceania.

Figure 6.6 Countries with privacy statements available online



Source: 2014, 2016, 2018 and 2020 United Nations E-Government Surveys.

Ethical issues have arisen as well, but these are often more difficult to address than privacy issues, as they may exist outside the law. Ethics can be considered a reflection of society's collective moral understanding.[50] The challenge for Governments is that ethics cannot always be codified in data policies; in cases where this is not possible, judgements on the appropriate use of government data are governed by a wider moral consensus. Ethics questions become more important when advances in technology are pushing the common understanding of the law to its limits or when relevant laws and policies are not in place. To add to the complexity, public perceptions around data privacy are diverse within and between societies and can shift over time.

Data-centric policies around digital government should always be driven by well-defined policy or operational needs and clearly articulated public benefits, and any attendant risks should be fully addressed. Transparency and accountability measures are essential for conveying the benefits of data initiatives, addressing data sensitivities, and precluding accusations of nefarious intentions.[51] There are a number of emergent approaches that can be used to protect privacy, including data triangulation,[52] data minimization, data anonymization, differential privacy, and the use of synthetic data. In relevant legislation and public privacy notices, Governments can highlight these approaches and also explicitly address issues such as disclosure of purpose, data use limitation and data retention. The Data Protection Act in the United States, for example, includes several provisions that reflect the minimization principle.[53] Data minimization can be achieved in a number of ways, including de-identifying or aggregating data, keeping data in registers, or querying against data (rather than making them fully available). Such approaches are used by private-sector entities such as Google and Uber; however, there is insufficient research and evidence on their applications and impact in the public sector.

As emphasized above, frameworks for privacy protection and the ethical deployment of digital government must be established and shared with the public. This is crucial, and yet it represents only a point of departure, as the digital revolution is defined by constant change, and new risks and scenarios will routinely emerge that require attention. Data policies will require frequent review and periodic revision to ensure continued relevance, applicability and effectiveness. To successfully address privacy and ethical concerns, Governments must understand public perceptions; through e-participation (see chapter 5), members of the population, including vulnerable groups, can clearly articulate their specific concerns around data and provide public authorities with the feedback they need to guide policy action.

6.3.3 Data literacy and data capacities

Most policymakers are aware that making effective use of available data assets can improve the delivery of public services and thus contribute to the creation of public value. However, many Governments, especially those in developing countries and countries in special situations, currently lack the requisite capacities to fully develop the potential of government data as a strategic asset and to mitigate the attendant risks and challenges.

With the increased sophistication of digital government and the introduction of new or amended data policies in various countries, there is an implicit expectation that public institutions and administrators will invest the time and resources required to become proficient in dealing with new data realities. Public-sector expertise is needed in a wide range of areas, including data access, analytics, visualization, data sharing, interoperability, evidence-based policymaking, data security, and privacy protection.[54] It is important that data capacities be developed early so that a strong foundation exists for future development; as the volume and applications of data increase, so will the complexity of managing data.[55] Effective data governance is essential, but the reality in many situations is that innovative data initiatives are driven and sustained not by the existence of relevant institutional frameworks but by passionate individuals.

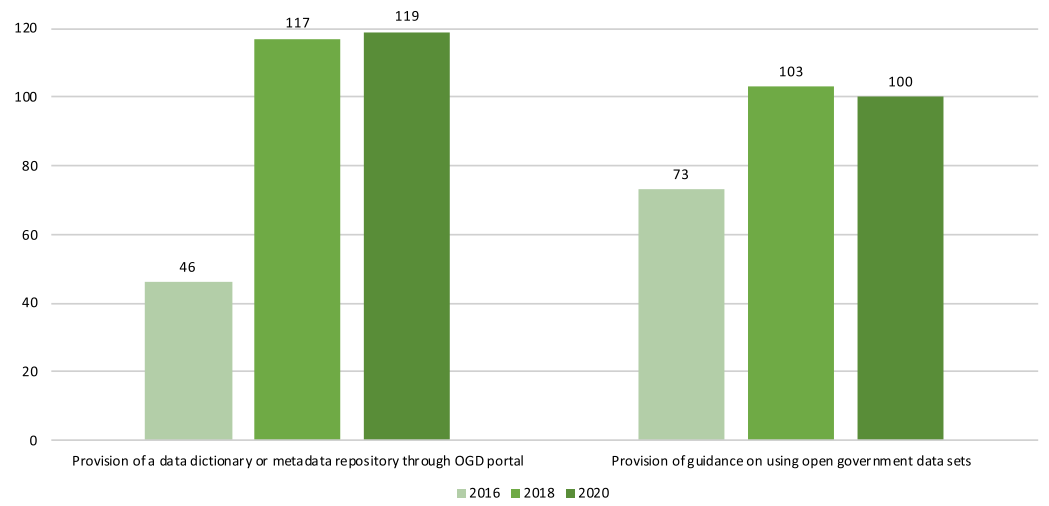
Institutions may not recognize the inherent value of their data, nor do they necessarily perceive data as existing separately from their IT systems; some institutions may not even be able to access their data, as vendors or third parties holding the data may block access. While institutions may understand the value that data governance can deliver, they may ultimately decide that the costs associated with developing a high level of data competence outweigh the perceived benefits.[56] Some policymakers may find it difficult to grasp the value-creating potential of data and data governance.

While Governments may have regulations or guidelines in place that could govern how public entities work with government data, these instruments are likely to be complex, subject to interpretation, too general (not written for a specific audience), and without a strong enough focus on data ethics or privacy. Very often, the innovative use of data science in the public sector pushes the boundaries of existing knowledge or capacities and can create grey areas. Strengthening data literacy and capacities enables public officials and administrators to navigate the new data realities and confidently pursue innovation in accordance with well-defined rules that ensure the protection of data security and privacy.

In some institutions, government data are seen as essential to or convenient for specific workflows or as a by-product of a digital environment but are not yet viewed as a strategic asset. There is a lack of understanding about what data can be used for outside immediate practices or processes. Capacity deficits seem to exist at different levels. What needs to happen is a change in the institutional culture and individual mindsets, with the reactionary approach to data shifting to a proactive view of data as an asset.[57] Becoming more data-centric represents a major change in the institutional culture across agencies at all levels (vertically and horizontally) and therefore requires strategic oversight at the national level.

While it is generally true that a higher level of data competency is required for data-centric policy development and execution, there are some emerging data technologies—such as self-service analytics—that make it easier to use data.[58] Policymakers and others without advanced data analytics skills can be eased into a more data-centric mindset through the use of self-service analytics and visualization tools. Figure 6.7 shows that the number of countries providing data dictionaries on their OGD portals increased from 46 in 2018 to 119 in 2020, and the number providing guidance on using open data sets rose from 73 to 119 during this period. Box 6.3 illustrates how Bangladesh is actively pursuing a strategy to build data capacities for government officials at all levels.

Figure 6.7 Countries providing data dictionaries and guidance through their OGD portals



Source: 2016, 2018 and 2020 United Nations E-Government Surveys.

Box 6.3 Building data capacities among government officials in Bangladesh

It is envisaged that the major objectives of Digital Bangladesh—a large-scale government initiative that reflects the priority assigned to digital government and the digital economy—will be realized by 2021. Bangladesh is expected to graduate from least developed country status in 2024, and initiatives such as this are helping to propel the country towards that goal. To support its long-term vision, the Government is strengthening the institutional capacity of government agencies to manage and facilitate the shift towards data-driven and evidence-based development planning, service design and policy implementation.

The Access-to-Information (a2i) initiative is the flagship programme of Digital Bangladesh and is charged with catalysing citizen-centric public service innovation to simplify and improve public service delivery. The a2i team deploys ICT solutions to support agencies in achieving national development strategy objectives and Sustainable Development Goal (SDG) targets. The a2i office, with the support of the United Nations Department of Economic and Social Affairs, has launched a series of capacity-development programmes for public officials at different levels. Within this framework, secretaries and deputy secretaries from different ministries recently attended two national-level workshops on strengthening institutional capacity in data-driven decision-making to support the sustainable development agenda. The workshops focused on e-government service delivery and accountability in support of SDGs 1, 4, 8 and 16.

In 2019, the a2i team also collaborated with the Singapore e-Government Leadership Centre (eGL) of the National University of Singapore and Temasek Foundation International in launching a programme to strengthen public administration by leveraging data analytics for decision-making. This programme—implemented in support of Digital Bangladesh and the country's overarching Vision 2021—incorporates discussions, case studies, site visits and workshops aimed at highlighting best practices in data analytics and appropriate frameworks for its governance and management. To kick off the programme, senior officials and experts attended the National Workshop on Data: Precious Resources of 21st Century in February of 2019.

Sources: Case study submitted by Bangladesh through the Member States Questionnaire; United Nations Department of Economic and Social Affairs, "Evidence-based e-government policies in support of the Sustainable Development Goals", Capacity Building Projects, available at https://publicadministration.un.org/en/Capacity-Building/Projects/Evidence-based-e-government-policies-in-support-of-the-Sustainable-Development-Goals; Temasek Foundation International, press release (2019), available at https://www.temasekfoundation-international.org.sg/file/our-newsroom/news-releases/2019/egl-tfintl-egl-press-release-final.pdf; and a2i, "National Workshop on Data: Precious Resources of 21st Century" (2019), available at https://a2i.gov.bd/national-workshop/.

6.4 Towards effective data governance and data-centric e-government

With the emerging trends in government data (see sections 6.1 and 6.2) and the mounting risks and challenges (see section 6.3), a paradigm shift is occurring that compels Governments to leverage data governance frameworks and data-centric e-government strategies to generate public value in innovative ways. Effective data governance at the national level requires the application of relevant principles and processes across all institutions.

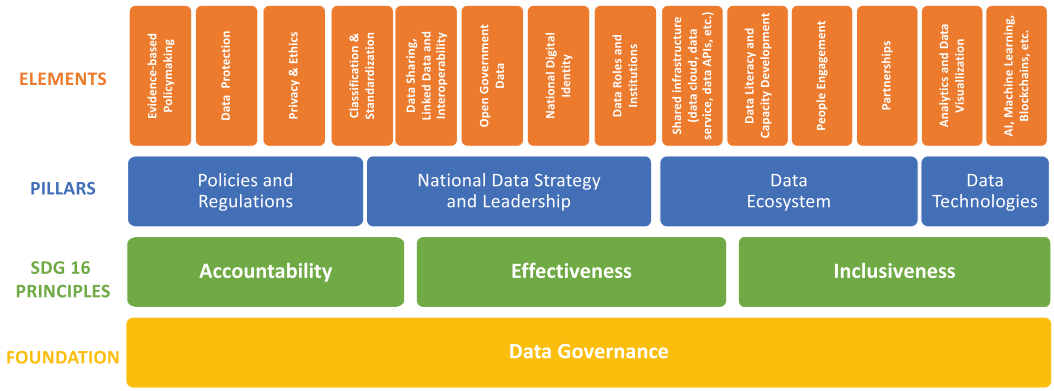
6.4.1 Data governance framework

Establishing an effective data governance framework is difficult for a multitude of reasons. There are often varying levels of data maturity across different agencies at different levels. Resolving data quality, accuracy and availability issues is necessary, but this offers only short-term solutions and does not address systemic inadequacies. Harvesting public value from data requires a long-term approach that involves mastering the economics and politics of data governance and management and effectively navigating the evolving data security and privacy landscape. As data governance encompasses much more than technical functions,[59] Governments must employ a holistic, whole-of-government approach in developing an overarching data governance framework supported by a national data strategy and a data ecosystem.

Existing governance structures often stand in the way of moving forward with effective data governance for data-centric e-government. In many legacy situations, data governance is still embedded in IT or ICT governance, which limits the ability of Governments to take advantage of new opportunities and to adequately address evolving challenges, including data security and privacy issues. One important reason data governance should not be part of IT governance is that a substantial amount of government data may be unusable or inaccessible because IT authorities may not be able to fix data problems or present data appropriately within the newer data frameworks and systems (including e-government platforms), and users may not be sure how to ask for or access the data they need; situations such as this can affect data availability, integrity, interoperability, security and privacy. In some instances, data governance is implemented on an ad hoc basis, but this is not an effective long-term strategy. Governments must adopt a comprehensive data governance framework with a structured approach that supports sustainable development.

Effective data governance comprises a homogeneous set of principles and practices that guide the formal management of data assets within all public institutions. An illustrative data governance framework for national e-government is shown in figure 6.8.

Figure 6.8 Illustrative data governance framework for e-government



Source: Adapted from Doris Maharlika H. Dizon and others, "Data governance in fostering policy coherence and collaboration for cleaning the River Ganga", in *Ganga Rejuvenation: Governance Challenges and Policy Options*, Ora-orn Poocharoen, Robert James Wasson and Xun Wu, eds., pp. 297-335 (Singapore, World Scientific Publishing Co., 2016), available at https://www.worldscientific.com/worldscibooks/10.1142/9715#t=toc.

As reflected in the four pillars shown in figure 6.8, data governance is supported by the dynamic relationship between policies, institutions, people, processes, and enabling technologies. The first and second pillars highlight the importance of legitimizing and institutionalizing policies for effective leadership. The third pillar—the data ecosystem—reflects the relationship between data processes and public engagement, and the fourth pillar highlights the adaptive application of technologies in supporting data use and governance. The primary aim of good data governance is to ensure that all data and data-related processes are trustworthy and standardized.[60] With appropriate data governance, decisions based on available data do not place the Government or the public at risk because of low data quality, data falsification, data obsolescence, or security or privacy threats. Essentially, data governance provides a focal point—a single source of truth—that allows Governments to guide data use and policy development in a coordinated manner.

A non-exhaustive list of global and regional initiatives relating to data governance is provided in table 6.5.

Table 6.5 Global and regional policy initiatives relating to data governance

	Regional/global entity	Year adopted/description/access
The right to privacy in the digital age	United Nations Member States	2013; General Assembly resolution 68/167 (https://undocs.org/A/RES/68/167)
Personal Data Protection and Privacy Principles	United Nations System	2018; voluntary for organizations within the United Nations System (https://archives.un.org/sites/archives.un.org/files/_un-principles-on-personal-data-protection-privacy-hlcm-2018.pdf)
Berlin IGF Messages on Data Governance	Internet Governance Forum (IGF)	2019; overview of discussions held during the IGF sessions, convened annually by United Nations Secretary General (https://www.intgovforum.org/multilingual/filedepot_download/9212/1802)
General Data Protection Regulation	European Union	2018; Regulation 2016/679; binding for European Union member States (https://gdpr-info.eu/)
OECD Privacy Framework	Organization for Economic Cooperation and Development (OECD), Working Party on Information Security and Privacy	2013; voluntary framework for OECD member States (https://www.oecd.org/sti/ieconomy/oecd_privacy_framework.pdf)
APEC Privacy Framework	Asia-Pacific Economic Cooperation; APEC E-Commerce Steering Group	2015; binding for the 8 APEC member States participating in the APEC Cross-Border Privacy Rules (CBPR) System; voluntary for the other 13 APEC member States (https://www.apec.org/Publications/2005/12/APEC-Privacy-Framework)
African Union Convention on Cyber Security and Personal Data Protection	African Union	2014; also known as the Malabo Convention on Cyber Security and Personal Data Protection; voluntary for 18 African Union member States (https://au.int/en/treaties/african-union-convention-cyber-security-and-personal-data-protection)
ASEAN Framework on Personal Data Protection	Association of Southeast Asian Nations (ASEAN)	2016; voluntary for ASEAN member States (https://asean.org/storage/2012/05/10-ASEAN-Framework-on-PDP.pdf)
OAS Principles on Privacy and Personal Data Protection	Organization of American States (OAS)	2015; voluntary for OAS member States (https://www.oas.org/en/sla/dil/docs/CJI-doc_474-15_rev2.pdf)
Standards for Personal Data Protection for Ibero-American States	Ibero-American Data Protection Network (RIPD)	2017; voluntary for 22 Iberian and Central and South American countries (https://www.privacysecurityacademy.com/wp-content/uploads/2019/03/Standards_Personal_Data_IberoAmerican_eng_Con_logo_RIPD.pdf)
Modernized Convention for the Protection of Individuals with Regard to the Processing of Personal Data	Council of Europe International Conference of Data Protection and Privacy Commissioners	2018; also known as Convention 108+; voluntary for 33 Council of Europe signatories and 3 non-Council of Europe signatories; mandatory for 3 Council of Europe ratifiers (https://edoc.coe.int/en/international-law/7729-convention-108-convention-for-the-protection-of-individuals-with-regard-to-the-processing-of-personal-data.html)
International Standards on the Protection of Personal Data and Privacy	International Conference of Data Protection and Privacy Commissioners (ICDPPC)	2009; also known as the Madrid Resolution; members: voluntary for 21 countries and the European Union (https://edps.europa.eu/sites/edp/files/publication/09-11-05_madrid_int_standards_en.pdf)

Source: Author's compilation; adapted from Center for Strategic and International Studies, "Explore the data—Technology Policy Program: data governance", available at https://datagovernance.csis.org/.

6.4.2 National data strategy and data leadership

Data leadership is essential for the implementation of the national data strategy and the data governance framework. Often required within this context is an institutional review that could transform the way agencies in all sectors and at all levels effectively deploy government data as a strategic asset. Garnering support for data initiatives from executive levels of government can be a challenge, especially for countries with low EGDI values. Those at the highest levels of government may be unsupportive because they do not fully understand or acknowledge the value data governance and initiatives can generate. This challenge is most apparent at the intersection of data exploration and exploitation; policymakers and other government leaders might not comprehend the value-creating potential of exploiting data assets until they have seen successful examples.[61] Inaction or indecision within the top tiers of government is problematic, as executive-level support is key to successful data governance. It is generally easier to communicate the value of data to all stakeholders within the Government if senior decision makers understand data and have helped align the goals of data governance with national and institutional goals. The ability of any institution to conceive strategic directions for their data governance is often dependent on the ability of top-level executives to understand the value-creating potential of data.

Many countries are becoming more aware of the increasing role and importance of government data and have introduced some important institutional changes. Chief data officers are becoming as common in national and subnational governments as chief information officers (CIOs) were a decade ago. CIOs, chief data officers, or other national C-suite officials with oversight of e-government development are likely to have government data oversight responsibilities and accountability as well. In some countries, data offices are set up at the highest levels, within the offices of the national, provincial or local leadership, and are commissioned to capture data, perform analytics and provide rapid policy solutions to public policy questions. Many Governments are now hiring data scientists, recognizing that their role in government is as essential as that of statisticians, information officers, economists and other quantitative social scientists.[62] There are also newly created functions, such as chief digital strategy officer, chief innovation officer, and other positions that require both a managerial and a practical understanding of data science. A review of the 2020 MSQs reveals that there are many different data roles in the realm of institutional data governance, including policymakers, decision makers and data stewards with leadership and oversight roles (policy advisory responsibilities and/or policy approval authority), as well as data analysts, data scientists and general public administrators. There is certainly no one-size-fits-all approach, but it is evident that not all public officials need to be trained and function as data scientists. Different data roles and skill sets are needed at different levels, as illustrated in table 6.6.

While it may be challenging to employ a whole-of-government approach (rather than a piecemeal or silo approach) in reviewing and consolidating data-related strategies, doing so will likely prove worthwhile in terms of moving towards treating data as a key government asset. Singapore provides an excellent example of how the data architecture and data leadership can be transformed at the national level (see box 6.4). When institutional reform for effective governance is not possible due to political or resource constraints, Governments should not dismiss the possibility of implementing incremental changes.[63] The first step would likely be the issuance of a mandate to create the institutional framework and infrastructure needed for a data ecosystem or national data service, and the second might be the establishment of a central entity such as an oversight body or a steering committee that could establish leadership and performance indicators, review security and privacy measures, devise structured processes, and carry out strategic planning. Pilot projects could be introduced to achieve quick wins and to demonstrate how data initiatives represent a viable approach to addressing developmental challenges and objectives, especially those relating to the SDGs and national development goals.

Table 6.6 Different roles and skill sets for data users in government

Roles (non-exclusive)	Description	Required skill sets
Data leadership, data stewards	Various titles and functions: • Chief data officer (national and/or subnational) • Chief digital strategy officer • Chief information officer • Chief government technology officer • Chief evaluation officer • Chief innovation officer • Data ambassador	Leadership skills (in technical and policy areas) to provide data oversight, policy and technical frameworks for data reuse, sharing, scalability (such as master data management), data quality, security and privacy; set cross-government data standards and manage inventory of data assets; manage OGD (Examples: The Government of New Zealand gave statisticians the title of chief data officer; in the United States, the first chief data officer was appointed in 2015.)
Policymakers and decision makers	Ministers, secretaries, directors general, or other senior officials with decision-making roles	Understand and interpret reports in data analytics for value-adding insights and decision-making; derive data-driven or data-centric insights to generate desired outcomes and impacts through strategic decision-making. (Senior executives are unlikely to be engaged users of analytics technology but can direct others to conduct analyses for them.)
Policy analysts (sectoral)	Those with analytical skills, especially with domain expertise relating to specific sectors (such as health or education); able to assist in policy analysis in support of public policymaking (from planning to implementation to evaluation)	Skills in using business intelligence tools and self-service analytics and adept at working with data to "discover" answers; provide data-driven insights and foresight for policymakers to understand structured and unstructured data; use algorithms in analytics software programs to make informed decisions in diverse fields (including health care, disaster management, crime and security, and traffic management)
Public officers (administrators)	The majority of public sector employees	Able to benefit from data visualizations; can use data for daily operations or reporting
Data scientists	Technically trained specialists in analytics and data science; "power users" associated with business intelligence	Trained academically or technically; have specific skills (able to deal with Python and other data tools and data services); able to handle data-based infrastructure, data warehousing and statistics; have a contextual understanding of domain subject-matter expertise; may have specialized skills (in areas such as AI)

Source: Compiled by author; adapted from J. Heckman, "OMB: Evidence Act guidance in 'very last stages' of clearance process", Federal News Network (2019), available at https://federalnewsnetwork.com/big-data/2019/05/omb-evidence-act-guidance-in-very-last-stages-of-clearance-process/.

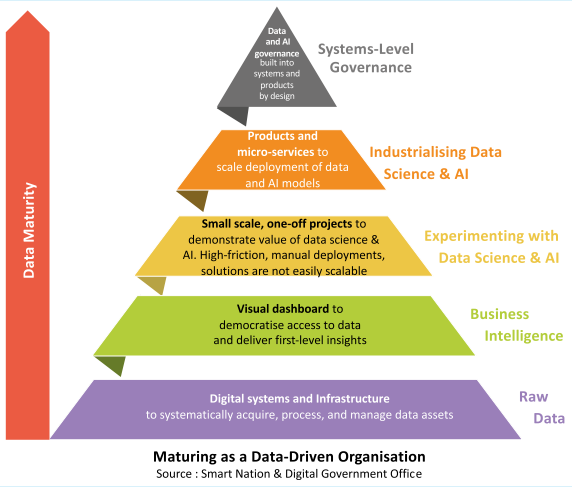
6.4.3 Building the data ecosystem

A national data strategy should be built around a data ecosystem that includes a solid data architecture, data cloud, analytics and visualization support and is able to engage people, promote partnerships and foster data innovation.

Box 6.4 Data leadership and the Government Data Strategy in Singapore

Data are recognized as the "heart of digital government" in the Smart Nation and Digital Government Office in the Prime Minister's Office in Singapore. In support of making future digital government more "user-centric and effective at delivering key outcomes",[c] a national data system has been put in place to achieve a "tight integration of data with digitalization" in agencies across departments and levels, targeting a wide spectrum of internal and external users, including individuals, businesses, and public administrators.[c]

In 2018, the Government Data Strategy was introduced to address issues with the existing government data architecture. The Government Data Office was established in the Prime Minister's Office to implement the Strategy by 2023. "The Strategy is centred on the public sector reorganizing itself around a new integrated data management framework. … It also identifies the horizontal enablers needed to manage data across its life cycle."c Trusted centres (TCs) aggregate data across the single sources of truth (SSOTs) "and provide a one-stop-shop for users to access core government data sets. Users who need cross-sectoral data sets will not need to go individually to each SSOT to ask for data. Three TCs, sited in the Department of Statistics (individuals and businesses), Singapore Land Authority (geospatial) and Smart Nation and Digital Government Group (sensors)," were scheduled for operationalization by the end of 2019.[c]



Maturing as a Data-Driven Organisation
Source : Smart Nation & Digital Government Office

Using a whole-of-government approach, "the Singapore Public Service has also made significant changes to organizational structures, placing data at the front and centre of agency digital transformation efforts" at the highest level of leadership.[c] The Government Data Office is putting together "a guide for agencies to develop and implement data strategies as part of their digitalization efforts. It is also developing a new competency framework for chief data officers (CDOs)"; this professionalizes the CDO role and provides CDOs with a mandate "to drive data transformation in their agencies".[c] A data science competency framework is also being strategized, supporting the provision of structured training to improve the data capabilities of public officers. "Further digitalization will generate more data that can be harnessed to bring about greater improvements. Data collected from sensors and Internet-of-Things devices could be triangulated with municipal feedback to develop predictive maintenance models for infrastructure such as lifts. This will enable agencies to go upstream to address the root causes of municipal feedback, and for government and residents to co-create more liveable neighbourhoods for all. This focus on data is what defines the Government's current transformation drive, which will put in place the policies, processes, systems and people that will enable the public sector to systematically acquire, manage, and exploit data on an industrial scale."[c]

Sources:

(a) Smart Nation Singapore, Smart Nation and Digital Government Group, available at https://www.smartnation.sg/why-Smart-Nation/sndgg;

(b) Govtech Singapore, Digital Government Blueprint, available at https://www.tech.gov.sg/digital-government-blueprint/; and

(c) Daniel Lim Yew Mao, "Bringing data into the heart of digital government" (Singapore, Civil Service College article, 8 August 2019), available at https://www.csc.gov.sg/articles/bring-data-in-the-heart-of-digital-government (figure reproduced from this source).

In considering data infrastructure requirements, Governments should be aware that, notwithstanding the exponential increase in the volume, variety and velocity of public data, not all data need to be stored. The obvious rationale is that storing vast or theoretically unlimited amounts of data without a defined purpose will eventually become unsustainable. That being said, most Governments will be dealing with a sizeable and ever-increasing quantity of data, and simply upgrading existing systems is often not sufficient to ensure that large volumes of data will remain accessible and can be shared, used and analysed efficiently. A strategy will need to be in place so that informed decisions can be made about what to keep and what to discard. The very act of choosing requires that judgements be made about the purpose of the data, and it is possible to regulate data more intelligently based on that purpose rather than trying to regulate the existence of the data.[64]

Governments are increasingly transitioning to cloud infrastructures. Although shifting from a traditional relational database server to a cloud server involves technical, organizational and policy challenges, it generally becomes a necessity when data expand beyond a certain size. Currently, the European Union is developing cloud-based systems to facilitate access to data from its Copernicus environmental monitoring programme,[65] and state governments in India are turning to commercial cloud providers to facilitate the provision of public services.[66]

Arguably, Governments pursuing an integrated system-wide approach to data (and all related tools, technologies, processes, infrastructure, governance, risks and challenges) have an advantage over those maintaining a siloed approach. Governments should also explore public-private data partnerships and multistakeholder partnerships.

Data and digital identity

Authentication—the process of verifying that people are who they say they are—is an essential first step in the provision of e-services.[67] Digital identity plays a central role in digital government development and data applicability, as it provides the basis on which data can be safely and securely shared within and between agencies to improve public services and their delivery. The success of e-government systems in Estonia is largely attributed to the country's electronic identity (eID) system; all citizens are issued chipped identity cards that enable them to authenticate themselves electronically, obtain access to e-government and private services, and digitally sign documents.[68] In Peru, the Government has undertaken a data-centric digital-identity-driven approach to achieving the SDGs (see box 6.5 on digital identity in Peru). The 2020 Survey indicates that 125 of the 193 Member States (65 per cent) have digital identity authentication in their portals to allow users to safely access e-services.

Public engagement

Governments are facing increasingly complex challenges in regulating the use of government data and data science. Giving the public a voice in data regulation can facilitate the process; specifically, the establishment of multiple venues and innovative mechanisms for public participation can help Governments address broader questions around ethical and beneficial data science, including, for example, issues relating to the development, dissemination and use of OGD and big data.

Through public engagement, public openness and transparency can be promoted not only in the use and sharing of government data, but also in the development and regulation of new technologies that are dependent on data. This openness is frequently operationalized by actions such as releasing data sets and sharing through data visualizations (such as SDG reporting and digital dashboard monitoring). Public disaffection around the use of data and new technologies and concerns over personal data security and privacy have led some Governments to introduce public engagement processes around government data and data science.[69] It is important to emphasize that inherent trustworthiness is important, as not everybody will want to engage, but everyone will want to know if the Government is using their data appropriately.[70]

The traditional practice of engaging people by inviting commentary and contributions to regulatory processes can be extended to data policies and practices, allowing e-participants to offer open public feedback on policy drafts, for example. The potential also exists for more inclusive forms of engagement with data than these limited one-off events provide. Social media are already being used for innovative forms of engagement, but quite often this engagement involves the use of data technologies rather than a focus on data science itself. From an analytical perspective, social media data require careful consideration; there is a difference, for example, in using individual tweets, aggregated tweets or metadata about tweets to assess the nature or depth of data engagement among users.

Box 6.5 Data and e-government integration through digital identity: delivering on the Sustainable Development Goals in Peru

For more than 100 years in Peru, civil registration and identification systems were tied to electoral processes, which effectively prevented the Government from delivering on its mandate. This changed with the creation of Registro Nacional de Identificación y Estado Civil (RENIEC), a single national agency that has taken charge of both functions. Through a decentralized but integrated system, the agency has transformed the processes of registering vital events and identifying citizens. It has integrated the civil registration, vital statistics and identity management systems and has linked these systems to e-government services provision. The integration was achieved through the adoption of standardized processes and guidelines, the introduction of digital technology, and the digitization of civil registration and identification records.

By linking the digital identity platform to public service delivery, RENIEC has ensured that more newborns receive nutritional support in a timely manner; what used to take two months now takes 72 hours, and the number of beneficiaries receiving support in the first month of life increased from 36 to 71 per cent. In line with the SDG principle of leaving no one behind, the Identity Restitution and Social Support Department is developing a project to provide customized training to civil registrars in indigenous communities; the objective is to provide training in 48 indigenous languages spoken by approximately 16 per cent of the population.

The new system and related initiatives are helping to reduce registration errors, promote inclusion, and reduce under-registration and are contributing to the achievement of SDG target 16.9.

Sources: Ana Maria Lebada, "Peru shows how data measures targeted at vulnerable populations help achieve SDG target 16.9", International Institute for Sustainable Development, SDG Knowledge Hub, news (9 January 2020), available at http://sdg.iisd.org/news/peru-shows-how-data-measures-targeted-at-vulnerable-populations-help-achieve-sdg-target-16-9/. (This is one of six case studies included in the Compendium of Good Practices in Linking Civil Registration and Vital Statistics [CRVS] and Identity Management Systems, launched at the Fifth Conference of African Ministers Responsible for Civil Registration, held in Lusaka from 14 to 18 October 2019.)

More information on e-participation is provided in chapter 5.

Data innovation, policy experimentation and evaluation

Partnerships constitute an essential component of the data ecosystem. One important collaborative configuration involves the Government providing opportunities for public and private actors to drive data innovation for the creation or modification of e-services with the aim of increasing economic or social benefits or otherwise generating public value. Enabling and empowering the co-creation of public services involves making OGD widely available and creating opportunities for experts to leverage open data, big data, geospatial data, real-time data and emerging data technologies to drive data innovation; contributing to the development of smart cities is one important objective for countries pursuing data innovation and is often the focus of co-creation initiatives.[71] The creation of more robust models of public ownership of personal data could move Governments to design innovative engagement exercises that reflect how data science is increasingly a part of everyday life; examples include crowdsourced data processing and OGD hackathons that leverage the knowledge of "public professionals" in (typically government-led) events aimed at driving data innovation. As shown in figure 6.2b, 49 per cent of countries promote the use of OGD through hackathons or similar events.

Under certain circumstances, data innovation can also be applied to data policy development and implementation. Governments could adopt an experimental approach to policy design, using empirical data to validate theoretical and historical understandings of the impact of variations in regulations and policies. Data innovation is often expected to have built-in scalability, but this is merely an assumption. Policy experimentation or regulatory sandboxes can provide opportunities

to study feasibility and scalability. Box 6.6 highlights a UN DESA initiative that supports data-centric approaches in policy experimentation and regulatory sandboxes focused on the deployment and evaluation of new technologies such as AI and blockchain in the public sector.

Box 6.6 Promoting data-centric policy experimentation and regulatory sandboxes

The risks, speed and complexity characterizing technological development frequently contribute to policy and regulatory challenges. Governments may have insufficient resources, expertise and capacity to fully access and utilize government data and to understand, assess, and keep up with rapidly evolving technology-enabled innovations, especially those deriving from AI, blockchain and other frontier technologies. In countries in special situations, stringent regulatory regimes and the lack of data and digital infrastructure are among the main factors undermining the development of and investment in technology innovations, and this affects progress towards sustainable development. Very often there are scenarios where under-regulation translates into missed opportunities or where regulatory overreaction stifles innovation and exacerbates digital exclusion.

Policy experimentation and regulatory sandboxes can create a more conducive and contained space where incumbents and challengers from the public, private and civil society sectors can experiment with innovations at the edge or even outside of the existing regulatory framework. In this environment, novel digital technologies, financial products, and business models can be tested under a set of rules, supervision requirements, and appropriate safeguards. These measures bring the cost of innovation down, reduce barriers to entry, and allow regulators to collect important insights before deciding if further regulatory action is necessary, especially when existing regulations (or the absence thereof) can impede innovation.

Through a Development Account Project for the period 2021-2024, UN DESA aims to improve the institutional capacity of selected countries in special situations to develop policy experimentation and regulatory sandboxes for new technologies. This innovative and catalytic approach to data development is expected to accelerate progress towards achieving the vision of sustainable development embodied by the 2030 Agenda.

Sources: United Nations, Department of Economic and Social Affairs, "Development Account: projects" (2019), available at https://www.un.org/development/desa/da/project-view-public/.

Finally, as with any policy, oversight throughout the process is critical. It is important to constantly evaluate whether the use of government data is consistently in line with agreed standards and governance frameworks and, critically for the public, to assess the extent of human oversight over machine decisions in the use of government data. Allocating only a minuscule amount of public funding for policy and programme evaluation is not uncommon.[72] One reason for this is that the rules designed to safeguard privacy also make it difficult and/or expensive to examine and evaluate the data that agencies collect while implementing policies and administering programmes. However, the notion that increasing data access will necessarily reduce privacy reflects a false dichotomy. Governments can and should do better on both fronts.

6.5 Conclusion

Government data are a public resource and constitute a sociotechnical phenomenon that both affects and is affected by economic, social, political and societal developments.[73] With the growing technological capacity to process ever-larger and more complex data sets that can provide policymakers with better insight and foresight and make e-services more efficient, accountable and inclusive, the potential and opportunities surrounding data abound, especially in the context of delivering on complex sustainable development targets. Shifting from "gut instinct" to data-centric policymaking is now a viable alternative and is rapidly moving towards becoming a strategic imperative.

Optimizing and maximizing the use of government data will increase the productivity, accountability and inclusivity of public institutions, in line with the principles embodied in SDG 16. Data-centric government will help build trustworthiness and public trust. Instead of the onus being on the public to generate trust, regulators and policymakers can leverage data to inspire public trust, progressively moving from trust to trustworthiness.[74] One could argue that data and digitalization are now at the centre of all development, but their full potential will not be realized until Governments can bridge data gaps, organize and integrate data and related policies and systems, and adequately address security and privacy concerns.

As observed from the Survey data collected in 2020, many countries have made significant strides in the areas of policy, institutional and capacity reform and are moving from data-informed, technology-driven or data-driven approaches to data-centric approaches that support inclusive, people-centric, evidence-based policymaking and that enable Governments to be more responsive and proactive in delivering predictive services across all sectors targeted for sustainable development within the SDG framework. While there is increasing emphasis on the centrality of data in implementing digital government for public service delivery, it is not clear whether data governance has been given sufficient attention. As has been emphasized throughout the chapter, effective data governance addresses not only the use of government data across agencies, but also issues relating to security and privacy.

Many benefits around government data have yet to be realized, especially in countries with low EGDI values. The greatest impediments to progress include a general lack of understanding of data and data science, low political priority and the absence of data leadership, resource constraints, and concerns about data quality, security and privacy. Countries often encounter challenges at the intersection of exploring and exploiting data assets, where Governments must weigh the costs, risks and benefits of complex data reforms.[75] Achieving data coordination and integration can also be difficult; the current silo-based practices and the different levels of data maturity across different departments and agencies can seriously undermine efforts to create national data strategies and establish cross-organizational data ecosystems.

This chapter has focused on government data and does not delve into individual data in the hands of the private sector (of which the Government serves as a regulator). Cross-border data governance and ownership—increasingly critical areas in global governance—are also outside the scope of this chapter. There are a number of areas relating to government data that would benefit from further exploration and expert analysis. Additional research is needed on the relationship and impact of the data economy and e-government, and more empirical studies are needed on data governance as it relates to the different areas of priority examined in this chapter.

Key observations from the chapter are as follows:

- Optimizing and maximizing the use of government data will make public institutions more productive, accountable and inclusive, in line with the principles reflected in SDG 16. Data-centric government will also help build public trust and strengthen trustworthiness.
- Many benefits around government data have yet to be realized, especially in least developed countries, small island developing States, landlocked developing countries, and economies in transition. The main barriers to progress include a lack of understanding of data and data science, low political priority and the absence of data leadership, inadequate data competencies, resource constraints, and concerns about data quality, security and privacy.
- As substantiated by the emerging trends in government data reflected in the 2020 Survey, a paradigm shift is occurring that compels Governments to leverage data governance frameworks and data-centric e-government strategies to generate public value in innovative ways. Effective

data governance at the national level requires the application of relevant principles and processes across all institutions and the adoption of a comprehensive framework for addressing evolving risks and challenges.

- Data governance is driven by the dynamic relationship between policies, institutions, people, processes, and enabling technologies. An effective national data governance framework for e-government should be underpinned by four pillars: policies and regulations, a national data strategy and leadership, a data ecosystem, and investment in data technologies. With appropriate data governance, decisions based on available data do not place the Government or the public at risk because of low data quality, data falsification, data obsolescence, or security or privacy threats.
- Harvesting public value from data requires a long-term approach that involves mastering the economics and politics of data governance and management and effectively navigating the evolving data security and privacy landscape. As data governance encompasses much more than technical functions, Governments must employ a holistic, whole-of-government approach in developing an overarching data governance framework supported by a national data strategy and a data ecosystem.

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7. Capacities for Digital Government Transformation

7.1 Introduction

Now, more than ever, government leaders are dealing with the critical question of how best to transform the public sector to effectively deliver services and achieve the Sustainable Development Goals (SDGs). For many countries, the answer is to leverage innovation and digital and frontier technologies. Digital technology applications can provide users with quick and easy access to public services and programmes and can also be used to create participatory mechanisms that allow people to become involved in decision-making and the design and delivery of services. Such technologies can support greater government openness and accountability and can be leveraged to increase public trust. At the same time, the use of digital technologies in government can pose risks and threats, including widening digital divides within and across countries and potentially undermining human rights, individual privacy and security of all kinds.

Not all countries are sufficiently prepared to promote innovation and leverage digital technologies to provide accessible, reliable, fast, personalized, secure, and inclusive services and empower people through open and participatory mechanisms. Many are not prepared to identify and address the risks associated with digital technologies.

Digital government transformation is not just about technologies. It is, above all, about public governance transformation and innovation as part of a country's overall national development vision and strategy. Developing capacities for digital government transformation is essential. This requires a holistic approach that is value-driven and institutionalized across all levels of government and society. It entails fundamental changes in the mindsets of public servants and in the way public institutions collaborate.

This chapter presents a holistic approach to digital government transformation in support of sustainable development. It does so by providing a clear framework for change, including key pillars for digital government transformation. It focuses on the critical role of systems thinking and integrated approaches. The chapter outlines how to conduct a situation analysis, undertake a visioning exercise, and devise a strategy and road map. It examines how to develop capacities at the societal, institutional, organizational, and individual levels. It emphasizes the importance of capacity developers. The chapter features strategies and innovative cases from across the world, providing concrete methodologies aimed at supporting countries' capacity development efforts in this area. The approaches illustrated are based on research

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and the capacity development work that the United Nations Department of Economic and Social Affairs (UN DESA) has carried out over the past several years. In particular, it relies on insights from its advisory missions and policy notes on digital government, innovation in public service delivery and public administration post-conflict reconstruction, and the United Nations Public Service Forum and Award initiatives. The chapter concludes with a set of recommendations on how to develop digital government capacity for effective, inclusive and accountable service delivery in support of sustainable development.

7.2 A holistic approach to digital government transformation in pursuit of sustainable development

Digital government transformation can be defined as the process of transforming governance models and interaction mechanisms between government and society and innovating government policymaking, organizations, services and programmes by leveraging digital technologies. It refers to a process of fundamental change requiring a holistic approach that puts people first and revolves around the needs of individuals, including those left furthest behind, and the mitigation of risks associated with the use of technologies. Some of the countries that have adopted this approach include Australia, Denmark, Estonia, Finland, the Republic of Korea, Singapore, Sweden, and the United Kingdom of Great Britain and Northern Ireland.

The central feature of a holistic approach to digital government transformation is the alignment of institutions, organizations, people, technology, data, and resources to support desired change within and outside of the public sector for the generation of public value. Digital government transformation that supports sustainable development should be based on an ecosystem approach that leverages systems thinking and integrated approaches that can address the interlinkages among the SDGs in delivering services. It should be transformative in the sense that it goes beyond incremental changes and embraces systemic change. It should be home-grown and leverage local knowledge while also taking into account good practices from across the world. It should be inclusive and ensure that any transformation is aimed at creating equal opportunities for all people to access reliable and quality services. It should be collaborative since providing integrated digital services requires a high degree of coordination among ministries and agencies and new mindsets in government and society. It should also be informed by people-centric approaches to service delivery and programme management, addressing concrete problems and needs experienced by different groups in society.

Several Governments have advanced a systems-thinking approach to policymaking and service delivery by using information and communications technology (ICT) to enhance operational linkages. They have adopted a holistic and integrated approach to the delivery of services by promoting both organizational and technological interoperability. Systems thinking "is a way for human beings to understand systems. … It focuses attention on how the system's constituent parts act together in networks of interactions as well as on how systems work over time and within the context of larger systems. … Systems thinking provides a means of seeing the system as an integrated, complex composition of many interconnected components that need to work together for the whole to function successfully."[1] The integration of public services makes it easier for people to "interact with public administration and get adequate and holistic responses to their queries and needs".[2] Singapore has adopted a holistic approach for its Smart Nation programme and digital transformation. It has moved from a silo-based approach to an ecosystem approach in which effective leadership, critical mindsets, and a solid legislative and regulatory infrastructure play a key role. Initiated in 2014, Smart Nation is taking shape through a series of strategic national projects. The Government is making every effort to integrate public services, pursuing a one-stop-shop approach through initiatives such as the National Digital Identification project, the establishment of platforms such as "Ideas!" that facilitate direct communication between people and government, the Moments of Life initiative,

and collaboration with international counterparts for emergency aid and notifications. Buy-in from the public and government departments and the hiring and promotion of the most highly qualified experts have been critical. In Azerbaijan, MyGov provides individuals with "personal cabinets" (accounts) they can use to review personal, financial, educational and other information about themselves and their family members and access public services. MyGov is a new approach to public services that addresses user needs in real-time through data-driven predictive digital government. Access to a wide range of e-services is granted through a single-sign-on (ASAN Login) system, and the portal is available for use on desktop and mobile devices. Government as a shared platform has been adopted by many countries as a key innovation to provide better services and enable collaboration between different stakeholders. Governments are also using different technologies and data to anticipate the needs of people through what is called "anticipatory governance"; for example, once the birth of a child is recorded in the civil registry, parents get automatic updates from the Government on vaccinations.

Integrated services help to link different agencies and break silos. In Uruguay, birth certificates create links between hospitals, the Ministry of Public Health, the country's eID-issuing administration, and the agency providing families with social services. The eVisa programme in Lao People's Democratic Republic links the Ministry of Foreign Affairs with the Ministry of Public Security's Department of Immigration. The Huduma Kenya Programme offers another example of effective public services integration. The new government service infrastructure is built on five platforms—centres, web portals, a mobile application, call centres, and a payment gateway—that offer physical or digital access to a wide range of services in one place. Officials adopted a one-stop-shop model of public services provision as part of the Kenya Vision 2030 plan of transforming Kenya into a newly industrializing middle-income country. In some countries, a user-driven approach to the creation of public services is being adopted, especially at the local level. Forum Virium Helsinki is one of the founding members of the European Network of Living Labs—spaces in which the public and private sector can come together to co-create innovative public service solutions, including smart city services such as traffic information platforms. Other municipal authorities have launched targeted initiatives; one example is the Mapatón project in Mexico City, which engaged 4,000 participants in a digital competition to create a bus map for the city.

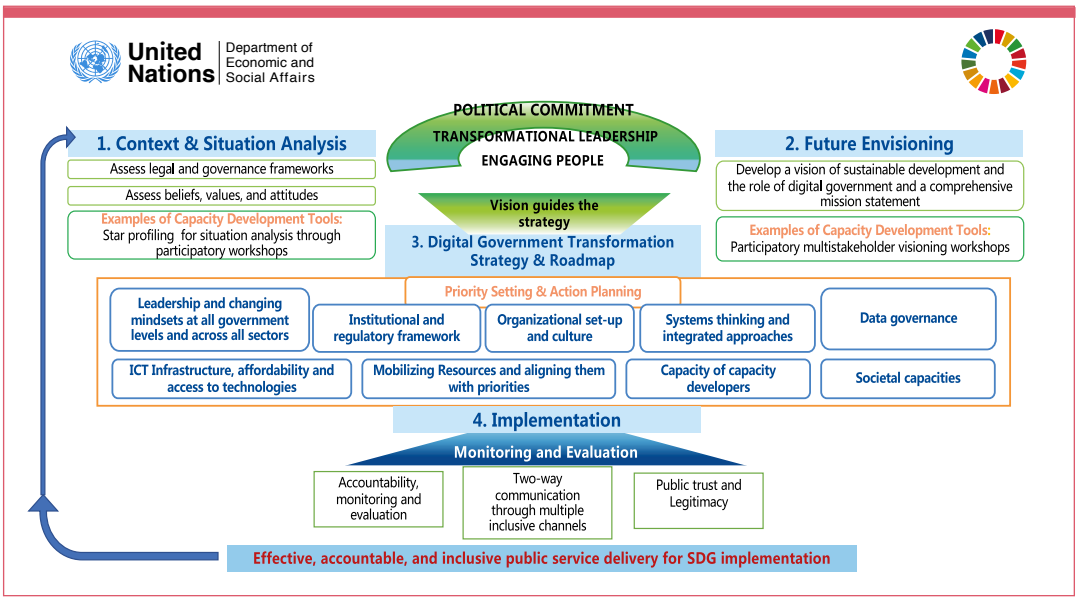
At the systemic level, a holistic approach to digital government transformation requires building deep capabilities and capacities.[3] The United Nations Sustainable Development Group defines capacity as "the ability of people, organizations, and society as a whole to manage their affairs successfully" and capacity development as "the process whereby people, organizations and society as a whole unleash, strengthen, create, adapt, and maintain capacity over time" to achieve their development objectives.[4] Digital government capacity reflects the ability of Governments and society to transform policies, programmes, processes and services by leveraging innovation and digital technologies. Comprehensive digital government capacity development is needed to ensure the delivery of accessible, reliable, fast, personalized, secure, and inclusive digital services and the engagement of people in decision-making processes and service design and delivery.

For the effective design and implementation of a holistic approach to digital government transformation, broad capacity development is needed at the institutional, organizational and individual levels in government as well as at the societal level. Political commitment at the highest levels of government is an essential precondition, as is a clear vision of the purpose of government transformation guided by a set of core values that are aligned with the 2030 Agenda for Sustainable Development. Capacities to engage in transformational leadership and change mindsets at the national and local levels and across all sectors in society are equally important. Digital government transformation also requires building digital capacities in government by attracting and retaining the best digital talent in a country.[5] Capacities to put in place a comprehensive institutional and regulatory

framework for digital government are critical. It is necessary to strengthen capacities to develop integrated approaches, effect organizational change, and enhance people's participation in public affairs. Capacities to mobilize resources, manage data, promote effective public communication, and address issues related to technology access and ICT infrastructure and affordability are also part of a holistic approach. Figure 7.1 maps the process of implementing digital government transformation and highlights the key pillars of a strategy and implementation plan. This can be used as a capacity development tool to identify the elements and steps needed to move the digital government transformation process forward.

The process of digital government transformation follows an iterative cycle comprising the following four steps or building blocks: (1) undertake a situation analysis to assess digital transformation capacity gaps and opportunities; (2) articulate a shared vision of government transformation and how digital technologies will be leveraged to achieve societal goals; (3) devise a strategy and a digital government implementation road map in which key pillars are identified; and (4) put monitoring and evaluation mechanisms in place to collect feedback that should then be used to inform the subsequent rounds of situation analysis, strategy development and implementation (see figure 7.1).

Figure 7.1 A holistic approach to digital government transformation and capacity development



7.3 Conducting a situation analysis to assess digital transformation capacity gaps and opportunities across all government levels and society

The first building block of a holistic approach to digital government transformation is a context and situation analysis to assess digital transformation capacity gaps and opportunities across all government levels and society vis-à-vis the national development vision and plan. This section looks at what a context and situation analysis entails, why leadership is essential to effect change, and why the process should be participatory in nature. It also provides examples of how a situation analysis can be conducted and highlights some of the existing capacity development methodologies.

A situation analysis requires an understanding of a country's history, social norms, values, beliefs, and attitudes and of national perceptions surrounding digital technologies. Understanding the values and beliefs of the Government and society is essential for determining how digital technologies can best

be used in government for the benefit of all people. A situation analysis also involves an assessment of the leadership's commitment to digital government and the state of public governance and public administration. It requires a review of relevant opportunities and challenges at the local, national, regional and global levels.

Most importantly, a situation analysis should take into account a country's future development goals. Any government transformation is fundamentally about political choices and priorities; technology merely plays a facilitative role. How technologies are used by Governments depends on the underlying values and aspirations of a nation. Whether the goal is to provide better services, reduce spending through increased efficiency, strengthen security, or reach vulnerable groups, digital government transformation is political in nature. The situation analysis helps to define the general development objective and how digital technologies can support the overall vision of a nation. The analysis should provide Governments with the information they need to identify the motivations for digital government transformation and why it is needed. Leaving the diagnostic assessment to ICT experts alone would undermine the commitment to promoting digital government for all. As part of the context and situation analysis, Governments should identify the specific expertise needed in IT, data, artificial intelligence (AI), cybersecurity, privacy and other critical areas and determine the level of digital knowledge and competence available within the country so that targeted steps can be taken to build digital competencies and capacities where they are most needed. Within this framework, digital government and developing digital capacities become a tool for supporting the implementation of a country's development vision and creating public value. The star profiling approach mentioned in figure 7.1 and illustrated in figure 7.2 provides a framework for analysing government transformation capacities and leadership capacities—an essential aspect of an effective digital government transformation strategy.

Figure 7.2 Star profiling model: assessing capacities for government transformation

Transformational leadership can be defined as a process in which "leaders and followers raise one another to higher levels of motivation and morality".[6] Leadership does not attach to one single

person or an individual institution but is instead represented by the complex system of leadership present in a specific context in all three governance sectors (the public sector, the private sector and civil society). The commitment of government leaders at the highest level is critical to the design and implementation of a holistic approach to digital government, as it is needed to overcome resistance to change and empower people to use their talents for innovation and inclusion. Leaders must commit to providing the resources and support needed to create an enabling environment for digital government, including new institutional and regulatory frameworks, organizational capabilities and change management, transformation planning and implementation processes, and the deployment of human, technological and financial resources. Leaders should also allocate resources for developing capacities, strengthening innovation capabilities, and cultivating partnerships. Identifying champions of change within the Government can help mobilize public servants and capacities for digital transformation.

To the extent possible, the situation analysis should be participatory in nature and engage a broad spectrum of stakeholders. Each department and level of government has an indispensable role to play in defining a holistic approach to digital government. All political and government leaders—at the local and national levels, from the executive, legislative, and judicial branches, and on provincial and village boards—should be involved. Local authorities are closest to the people they serve, and their involvement in a situation analysis is critical for digital government transformation and for effective, accountable, and inclusive public service delivery.

Involving individuals and members of civil society in the situation analysis is also important. The voices of individual residents, communities, youth groups, women's associations, non-profit organizations and other non-governmental actors need to be included in identifying gaps and mapping out opportunities for digital government transformation. Though it can be a lengthy and time-consuming process, involving people from different backgrounds can help to ensure that the services delivered by the Government are built around people's needs. ICT industry leaders, innovators in the business community, and others involved in a country's productive sectors must also be an integral and active part of the process. Engaging everyone in the situation analysis can enhance trust in public institutions and ensure that digital governance serves society's aspirations and goals. If the situation analysis is not participatory, it might be difficult to ascertain the needs of every sector of society, particularly vulnerable groups, and address them as part of a holistic approach to digital government transformation.

There are multiple modalities available for situation analysis. For example, data can be collected through an online government survey administered to all government agencies, businesses, and individuals. Participatory workshops and focused working groups organized by government entities at different levels, preceded by multistakeholder mapping, can also be useful tools. Mauritius conducted a comprehensive situation analysis that engaged people through surveys, focus groups and other means to inform its Digital Government Transformation Strategy 2018-2022.[7]

Table 7.1. provides a diagnostic framework that can help Governments identify where they are in relation to each of the key pillars for digital government transformation. The features highlighted in the table are grounded in empirical analysis and case studies collected from a number of countries but are by no means exhaustive. A country rarely falls entirely within one of the digital government development categories highlighted in the table. Usually, a country will exhibit features from different categories and may move forward or slip back over time. The movement from one digital government category to the next is not always linear but can be iterative, and it may not happen at the same time for the whole country. In any case, it is important to assess where a country is situated and to identify the changes or steps needed for improvement. As a reference point, features of the most digitally advanced countries fall within the "transformative" category.

Table 7.1 Key pillars for government transformation, by digital government development category

	Online presence	Transactional	Connected	Transformative
01 Vision, leadership, mindsets	Individual leaders in IT department support e-government; Reactive mindsets	Some e-government champions across government	Leadership's commitment at top level creates an environment that allows people to become more involved	Transformational leadership and full support for digital government from leadership at all levels of government; digital strategy is embedded in or aligned with the national development strategy Teams aligned around data; forward-looking, proactive/anticipatory, innovative, digital and adaptive mind-sets
02 Legal and institutional framework	Basic laws are in place	Regulators as watchdogs; some form of legal authentication of citizen ID	Most legislation in place	Regulators as facilitators; Farsighted and comprehensive legal framework; strong Digital ID; regulatory sandboxes to explore use of emerging technologies
03 Organizational set-up and culture	Not centralized	E-government coordination is under a ministry such as the ICT ministry	CIO at the central level	CIO located within the highest-ranking decision-making body in government with budgetary autonomy; multidisciplinary and cross-functional teams; network of CIOs national/local levels Environment of continuous learning to quickly adapt to change; operational agility, e.g., analytics-enabled human resources to identify and bridge skills gaps, and procurement engages innovative start-ups; augmented workforce or human and machine collaboration, which require among other things, creativity, strategic decisions and empathy; freeing up employees to carry out higher value-added tasks which require creativity
04 Systems thinking and integration	Departments work in silos; low integration of services; information available online	Two-way communication with people; downloadable forms' some e-government projects are experimenting with integrated approaches	E-services cut across ministries and departments and services are provided in a seamless manner; from government-centric to people-centric service delivery	Strong single government website; "Digital-first principle," digital by default, digital by design and mobile-first principle Public service delivery as an integrated system; strong National Digital ID; anticipatory people-centric and people-driven services; co-creation of services Government easy to deal with, responsive and adaptive to people's needs
05 Data management	Limited access to accurate, timely, disaggregated and widely available data	Transaction data–based culture	Data integration and synchronization	Data governance office; once-only (data) principle; data-driven culture; evidence-informed decisions; continuous monitoring and improvement of data; open, machine-readable government data and high usage of open data
06 ICT Infrastructure, affordability & access	Low connectivity; Low availability of hardware No strategy on ICT investment as a whole; IT centric	Customer centric	One single government website	High broadband connectivity, use of frontier technologies, big data; platform business model; decentralized and interoperability architecture; secure by design; blockchain as a security feature; ecosystem centric
07 Resources	Little or no investment for digital transformation	Investment for specific projects	Large-scale investment	Whole-of-government and long-term approach to IT investment, including sustainability in financing; public-private partnerships
08 Capacity of capacity developers	Limited capacity	Investment in computer labs	The use of ICT integrated in all curricula	Strong partnerships with academia, think tanks, private sector, i.e., innovation labs, and other national governments, e.g., regional cybersecurity training; engagement of schools of public administration in building curricula for digital capacity and other relevant skills, continuous training of trainers
09 Societal capacities	Limited programmes in place to build societal capacities	Outreach activities to some vulnerable groups		Digital literacy in society high and Internet penetration also very high at all levels; omni or multichannel approach to lifelong learning' partnerships between government and local ICT industries; maintain trust in government and ICT security, safety and privacy

Box 7.1 Government of South Australia: Digital Strategy Toolkit

The Government of South Australia, recognizing an inherent reluctance to support digitalization efforts, has developed a toolkit that provides local government organizations with a comprehensive guide on digitalization and establishes a clear pathway towards digital transformation. Importantly, this is part of a digitalization strategy and is not linked to an ICT-specific policy; the Toolkit does not revolve solely around digital communication or technology infrastructure. The Toolkit consists of four essential parts:

(1) a digital maturity assessment tool,

(2) a digital transformation prioritization tool,

(3) a digital strategy template, and

(4) a digital strategy implementation plan template.

The four components of this Toolkit allow users to assess not only their current situation but also which avenues to prioritize in order to avoid risky projects. While parts 1 and 2 are assessment- and metrics-based tools, parts 3 and 4 are essentially road maps that detail the ways forward in response to the organizational needs determined by the answers and information derived from sections 1 and 2. The Toolkit emphasizes that there is no one-size-fits-all approach. The four parts culminate in a tool designed to help users map out a high-level implementation plan for "their" digital strategy.

Sources: Government of South Australia, "Digital transformation toolkit" (https://www.dpc.sa.gov.au/responsibilities/ict-digital-cyber-security/toolkits/digital-transformation-toolkit)

Governments and international organizations have devised different methodologies for capacity development. The Government of South Australia has developed the Digital Strategy Toolkit for local organizations to draw attention to issues related to digital government transformation (see box 7.1). The Digital Government Readiness Assessment Toolkit created by the World Bank Group informs Governments of their status, highlights gaps, and prioritizes actions; it incorporates a "visioning" tool based on key data metrics and targets low- and middle-income countries.[8] The UN DESA Readiness Assessment on Institutional Arrangements for Policy Coherence to Implement the 2030 Agenda[9] is another relevant capacity-development tool. It is designed to diagnose the extent to which existing public sector values, priorities and strategies enable the implementation of integrated policies and to assist Governments and policymakers in developing, monitoring, refining and improving the context within which policy coherence is implemented. Technology and digital capacity are key elements of the Readiness Assessment.

7.4 Envisioning how digital government transformation can facilitate progress towards the Sustainable Development Goals

The second building block of a holistic approach to digital government transformation involves undertaking a visioning exercise that can help define where the country intends to go and how digital government transformation can contribute to sustainable national development. This section examines what a visioning exercise for digital government transformation is and highlights some useful capacity-development approaches.

The visioning of future development needs should revolve around a country's strategic development objectives and not around ICT and digital government. Digital technologies themselves do not deliver public services. They are a tool that can be leveraged when there is a political commitment to transformation, a comprehensive digital government transformation strategy and road map, adequate capacities to effect change, and an implementation plan. The visioning exercise should include defining governance principles, national goals, digital government values, and priorities for the short and long term. In 2018, the United Nations Economic and Social Council elaborated eleven voluntary principles of effective governance for sustainable development that can provide guidance to countries.[10]

Visioning workshops and tools can be beneficial for achieving consensus on a desired future state of affairs. For example, "design thinking" methodologies can be applied to any issue, allowing people to solve problems by empathizing with users, defining needs, ideating, prototyping solutions, and testing them.

7.5 Developing a strategy and road map for digital government transformation and capacity development

Once a country's needs, goals, principles and priorities have been identified, the strategy and road map for digital government transformation can be built around the nine key pillars highlighted in figure 7.1 and table 7.2. A capacity-development programme around these key pillars should be an integral part of the implementation plan. This section explores the purpose and content of a national strategy for digital government transformation. It highlights the critical importance of aligning the digital government transformation strategy with a country's national development strategy and with local-level strategies. It also outlines the key pillars of a digital government implementation road map and plan.

National strategy for digital government transformation

Digital government transformation should be integrated into a country's development strategy and aligned with the SDGs as a comprehensive framework for social and economic progress and environmental protection. An effective national strategy for digital government transformation identifies the overall purpose of digital government for that country, how it relates to the country's SDG priorities, its key development objectives, and how it will benefit people. It also specifies how it is aligned with subnational-level strategies and places emphasis on both "leaving no one offline" and "leaving no one behind". The strategies of the most digitally advanced countries also emphasize e-participation, digital inclusion, and the digital-first, digital-by-default, digital-by-design and mobile-first principles, as well as the once-only (data) principle and the use of new technologies such as AI, blockchain, and big data.

The 2020 Member States Questionnaires (MSQs) indicate that 130 of 137 countries have aligned their national development strategies with the SDGs. According to the 2020 United Nations E-Government Survey, 151 of the 193 Member States presently have a digital strategy, and 123 have a digital security strategy. Information on whether the national strategies for digital government transformation are aligned with the national development strategies is not available. There are some examples of this, however. South Africa has developed a digital transformation strategy to transform the country into an inclusive digital society in which all people can benefit from the opportunities offered by digital technologies to improve their quality of life.[11] In Bahrain, the Digital Government Strategy 2022 is aligned with the Economic Vision 2030, which focuses on sustainable development,[12] and with the Government Action Plan 2019-2022.[13] In February 2017, the Government of the United Kingdom of Great Britain and Northern Ireland launched the Government Transformation Strategy 2017 to 2020, aimed at transforming the relationship between people and the State. It has focused on developing the right skills and culture among people and leaders and on putting more power into the hands of people. It has also contributed to the better use of data and the creation of shared platforms to accelerate transformation. The Government Digital Service oversees the implementation of this Strategy.[14] The UK Digital Strategy 2017, led by the Department for Digital, Culture, Media and Sport, is closely aligned with the Government Transformation Strategy and is for the whole of the United Kingdom. The Digital Strategy sets out how the Government will develop a world-class digital economy that works for everyone.[15]

Aligning the national digital government transformation strategy with local-level strategies

For effective and inclusive digital government transformation to occur, it is essential for countries to align their national digital strategy and implementation road map with local and other subnational strategies and plans. It is also important to involve local authorities in the design of a national digital strategy and to avoid top-down approaches, which often result in a lack of implementation of the digital strategy at the local level and a low uptake of digital services.

There are some good examples of how national Governments and local-level authorities are collaborating. According to the 2020 MSQ for Denmark, the three levels of Government in that country (municipal, regional and State) have agreed on a common public sector strategy for digitalization, the present version being the Digital Strategy 2016-2020. Every four years, dating back to 2001, these three actors agree on a shared public sector strategy that includes a range of initiatives for digital government focusing on priorities such as digital infrastructure, data reuse, data security, digital welfare solutions and digital business solutions. Australia adopted its Digital Transformation Strategy in 2018 with the aim of providing digital access to all government services by 2025. The accompanying Digital Transformation Roadmap, which serves as the implementation plan for the Strategy, includes key milestones and projects and is updated each year. The Strategy and the

Roadmap are aligned with strategic objectives at the subnational level[16] and reflect the Government's commitment to use and explore new, emerging, and frontier technologies such as blockchain, big data, and secure cloud systems to deliver better services for people. Principles of effectiveness, inclusiveness, accountability, trustworthiness and openness direct how the Government applies these technologies. The Strategy and the Roadmap—together with the Digital Service Standard, "a set of best-practice principles for designing and delivering government services"[17]—encourage the Government to strengthen digital engagement through services designed around people's needs. Strong emphasis is placed on approaches that involve people in the design and delivery of government policies, programmes and services. In Australia and elsewhere, digital government strategies are usually reviewed after a certain number of years to ensure that they reflect the needs and aspirations of the country's people and the integration of relevant technological advancements.

Road map and implementation plan

A country's road map for digital government transformation should be built upon key pillars that can help promote effective, accountable and inclusive digital government. As reiterated in table 7.2, there are nine key pillars that should serve as focal points for digital government transformation. (Data governance is extensively addressed in chapter 6.)

Table 7.2 Key pillars of a road map for digital governance transformation and digital capacity development

1.	**Vision, leadership and mindsets:** Strengthen transformational leadership, build digital capacities, and change mindsets at the individual and institutional levels.
2.	**Institutional and regulatory framework**: Establish a comprehensive legal and regulatory framework for the development of an integrated institutional ecosystem.
3.	**Organizational set-up and culture:** Transform the organizational set-up and culture.
4.	**Systems thinking and integration**: Promote systems thinking and the development of integrated approaches to policymaking and service delivery.
5.	**Data governance**: Ensure the strategic and professional management of data to address data access and use priorities and enable data-driven policymaking.
6.	**ICT infrastructure and affordability and access to technology:** Provide access to high-speed broadband Internet and safe and secure access to new technologies for all.
7.	**Resources:** Mobilize resources and align priorities, plans and budgeting, including through public-private partnerships.
8.	**Capacities of capacity developers**: Enhance the capacities of schools of public administration and other capacity-building entities and mechanisms.
9.	**Societal capacities:** Develop capacities at the societal level to bridge the digital divide and ensure that no one is left behind.

Source: 2020 United Nations E-Government Survey.

An implementation road map for digital government transformation should always be aligned with and integrated into the Government's overall development strategy. As noted previously, there should also be alignment with subnational strategies to ensure that local perspectives are incorporated into national development plans. The digital government transformation road map should include actions to transform the government into an open, collaborative, interconnected organization structured around an architecture of integrated services. Simplifying processes, reducing administrative burdens, promoting interoperability, and strengthening data and knowledge management may be part of the transformation process, depending on the national context. There may be provisions for restructuring back-office operations to optimize resources and improve services. The road map may

also include actions aimed at facilitating public-private partnerships and enhancing collaboration for public value co-creation. It is important for the road map to specify how resources will be mobilized for the implementation of digital government transformation; there should be a solid connection between institutional mandates, services to be delivered, mechanisms to be employed, channels to be used, and respective budgets.

A road map must include short-term, medium-term and long-term projects that are aligned with the digital government transformation vision. It is advisable to start with projects that can be completed relatively quickly and easily, as demonstrated progress and success will encourage public buy-in and support for the transformation process.

Box 7.2 Organization for Economic Cooperation and Development: Going Digital Toolkit

OECD has developed a comprehensive framework and analytical toolkit that is designed to guide and support countries in their digitalization efforts. It starts with an assessment of a country's level of digital development and aids in the formulation of policies, strategies and approaches in response to seven metrics based on thirty-three indicators, as follows:

(1) ***Jobs***: share of ICT and digital-sector jobs in total employment; ICT training; new STEM graduates; public spending on labour market policies

(2) ***Market openness***: cross-border e-commerce sales; share of digitally delivered services in the commercial services sector; digital services value in manufactured exports; digital services trade restrictiveness; foreign direct investment restrictiveness

(3) ***Access***: fixed and mobile broadband penetration; M2M SIM card use; mobile data use; business broadband use

(4) ***Trust***: abuse of personal information or privacy violations; non-use of ICT due to payment-security or product-return concerns; internal employee provision of ICT security and data protection

(5) ***Society***: Internet use among older persons, lower-income households, indigenous peoples and young women; digital equipment use at work and in telework from home; high-performing youth in STEM and reading; e-waste generation

(6) ***Innovation***: ICT investment; business R&D expenditure in information industries; venture capital investment in the ICT sector; share of start-ups in the business population; computer science documentation use; ICT-related patents

(7) ***Use***: individual Internet users; individuals using the Internet to interact with public authorities; Internet users that have made recent online purchases; small businesses with recent e-commerce sales; businesses purchasing cloud services; adults proficient in problem-solving in technology-rich environments

Sources: Government of South Australia, "Digital transformation toolkit" (https://www.dpc.sa.gov.au/responsibilities/ict-digital-cyber-security/toolkits/digital-transformation-toolkit)

To ensure the effective implementation of the road map, Governments need to elaborate a comprehensive set of priorities and an action plan for capacity development at all levels of government, including investment in research and development. Action planning can outline specific measures for developing capacities for digital government based on a comparative analysis of the current situation and the country's vision for the future. Depending on the findings of the situation analysis, public institutions may need to strengthen their capacities across one or more of the nine pillars of the digital government transformation road map. Guided by the situation analysis, ICT experts can work

with government agencies to establish guidelines for developing digital government transformation capacities to facilitate the implementation of the national development plan.

The UN DESA DiGIT4SD toolkit can help countries—especially least developed countries, landlocked developing countries and small island developing States—develop and implement digital government strategies and initiatives in support of SDG implementation. The toolkit includes measures for monitoring and review during both the planning and the implementation phases.[18] It shares tracking methods for measuring the implementation of relevant policies and activities and evaluation and audit methods for assessing SDG implementation and the achievement of targeted objectives.[19] There is also an OECD toolkit that provides countries with digital development support (see box 7.2).

7.5.1 Capacities at the institutional level

Governments require the right institutional capacities to harness new technologies for the realization of broader societal goals, including the achievement of the SDGs. Institutions are rules that prescribe behaviours and structure political, economic and social patterns of interaction to create order. "They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct) and formal rules (constitutions, laws, [and] property rights)".[20] This subsection focuses on the importance of establishing an institutional ecosystem for digital government transformation, the critical role of regulators, the type of institutional capacities needed for digital government, and the key elements of how to establish a comprehensive institutional framework. It also provides national examples of comprehensive institutional frameworks for digital government transformation.

Governments need to put in place an institutional ecosystem for the adoption and application of digital technologies and the deployment of digital government services. This ecosystem must incorporate laws, regulations, policies, guidelines and standards that address issues such as access to information, data privacy protection, digital security, and AI legislation. Re-engineering business processes in the back office to ensure seamless service delivery often requires legal reform. Providing personalized services online may call for an electronic signature policy while also requiring new regulations on how agencies handle private data provided by individuals as part of those transactions. Many countries that are at a relatively advanced stage of the digital government transformation process have established legal and regulatory frameworks to support digital government services, including legislation governing access to information, personal data protection (including digital security), open government data, digital identity, digital signatures, the digital publication and dissemination of government expenditures, data interoperability, emerging technologies (such as AI) and related applications, and digital government as a right. Robust standards must be established for the whole of government to ensure coherence and safety in the deployment and application of technologies in all areas and at all levels of public administration.[21] According to the 2020 MSQ for Estonia, the country's e-government portal provides a login that allows users to view their personal information, use e-services and read messages sent by the Government. It is a secure gateway to the e-State, providing reliable and up-to-date information on individuals and the Government, safe access to e-services, and guidance on how to interact and engage in transactions with government entities.[22] To achieve all this, the Government had to formulate and activate comprehensive legislation, including the Public Information Act, Personal Data Protection Act, Cybersecurity Act, Identity Documents Act, Electronic Identification and Trust Services for Electronic Transactions Act, State Budget Act, and compliance of the State Information Management System with the Estonian Interoperability Framework. Some countries have produced catalogues that provide information about systems, databases and related key contact points, data fields, data sharing services and enabling legal frameworks, and other digital assets. This type of resource is an indispensable tool for developers and administrators involved in the planning, design and management of State digital services and systems.[23] The United Kingdom translated recommendations and principles from its

digital transformation strategy into a Technology Code of Practice (TCoP), which establishes criteria to help the Government design, build and buy technology; all government departments are required to comply with the mandatory points of the TCoP in the implementation of their technology projects or programmes and are advised to comply with as many of the optional points as possible in order to achieve maximum benefit.[24]

In developing a comprehensive institutional and regulatory framework that allows countries to deliver digital services in a convenient, reliable, secure and personalized manner, it is necessary to take stock of what laws and regulations exist and how they are interrelated in order to identify gaps and establish a point of departure for the adoption and harmonization of legislation fully supportive of digital government transformation. Given that archaic laws, old regulatory regimes, and overlapping and conflicting authorities can greatly complicate or even halt digital government implementation, the development of a comprehensive regulatory framework is a priority.[25] Regulatory and legal frameworks should be aligned with the broader national objectives of a country. As a caveat, digital policies may need to define the desired balance between access to information, security considerations and privacy concerns. Changing procurement rules and practices and strengthening the relevant implementation capacities of public institutions are also central to digital government transformation.

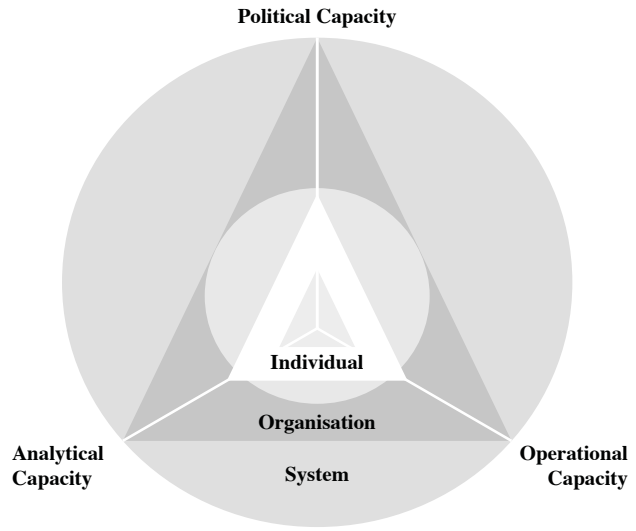
When developing legislation, regulations and strategies for digital government transformation, it is essential to take the needs of vulnerable groups into account from the start, with emphasis given to safety, availability, affordability and access to services. Presently, very few national AI strategies address the risks, access gaps and impacts associated with AI-based technologies as they relate to women and marginalized populations. In countries actively leveraging frontier technologies, vulnerable groups are often left behind because they lack digital literacy and digital competencies, further widening the digital divide. Among the AI strategies of 17 countries around the world, only two (France and India) have medium to strong references to inclusion, and three (China, Germany and the United Kingdom) have some references.[26] Institutions should also use a gender lens in building and coordinating technology and data-related regulatory frameworks, and digital inclusion and digital equality should be explicit in policy objectives.

In the past, digital regulators acted as watchdogs, gatekeepers and arbiters, dealing with discrete technology issues or changes; more recently, their role has become that of a facilitator and partner in shaping ICT and digital regulation, as they are actively "working with other stakeholders to shape a common digital future".[27] The International Telecommunication Union (ITU) calls this "collaborative regulation".[28] The GSR-18 Best Practice Guidelines call for putting in place measures such as regulatory sandboxes, start-up and experiment interfaces, and 5G pilot projects to promote regulatory collaboration and innovation.[29] Mozambique and Sierra Leone have already set up regulatory sandboxes.[30]

New government capacities are needed to address institutional and regulatory requirements for the integration and use of rapidly evolving technologies. Many countries, especially those in special situations, do not have sufficient institutional capacity to leverage the benefits of digital technologies while mitigating the risks deriving from threats such as cybercrimes and cyberattacks. Generally speaking, no Government can address regulatory issues alone; multistakeholder engagement and the sharing of experiences are key to success. As noted by Liu Zhenmin, United Nations Under-Secretary-General of Economic and Social Affairs, "fast-paced technological change … demand[s] a collective effort and a stronger multilateral response".[31] According to the 2020 MSQs, 119 out of 137 countries have engaged in subregional, regional or international cooperation relating to e-government,[32] demonstrating the importance of collaboration among countries in digital government and regulation.

To ensure that a solid regulatory framework translates into effective policy action, analytical, operational and political capacities are required at the system, organizational and individual levels (see figure 7.3). "Analytical-level capacities ensure [that] policy actions are technically [feasible] and can contribute to [the] attainment of policy goals. Operational-level capacity allows the alignment of resources with policy actions so that they can be implemented in practice. Political-level capacity helps to obtain and sustain political support for policy actions."[33]

Figure 7.3 Strengthening policy capacity, competencies and capabilities for digital government transformation



Source: Maria Katsonis, "Rethinking policy capacity, competencies and capabilities", figure 1.A, *The Mandarin* (10 June 2019), available at https://www.themandarin.com.au/109791-rethinking-policy-capacity-competencies-and-capabilities/.

Policymakers across all sectoral areas must have the capacities to assess the impact of using frontier and digital technologies in government. They also need to recognize the implications of policies for digital government and take proactive steps to ensure that public policies support, rather than impede, efforts to leverage ICT to transform government. A thorough understanding of the potential positive and negative effects of existing policies on the use of new and emerging technologies (such as AI) and a comprehensive understanding of the technologies themselves are necessary to formulate relevant new laws and policies. Partnerships among public and private sector actors, universities and think tanks can help build the necessary understanding of the impacts of new technologies, how they can benefit societies, the risks they pose in terms of safety and security, and the ethical issues that must be addressed in their design and use. Bringing together different perspectives and expertise makes the policy implications of a quickly evolving digital landscape more readily accessible to government officials.[34]

7.5.2 Capacities at the organizational level

Organizational capacity relates to government structures that define authority, roles and responsibilities, accountability and reporting lines, and mechanisms and processes for coordination and communication. This subsection examines why a whole-of-government approach is essential for the integration of organizational processes and public service delivery and showcases a number of central coordination mechanisms that can facilitate collaboration across policy areas and government levels. It also focuses on the importance of government interoperability to support the sharing of information and services. The importance of changing the organizational culture to foster collaboration and innovation within the public sector is emphasized as well.

Changing laws and regulations is not enough to effect change within and outside of government. To move the digital government transformation process forward, there is a need for organizational structures that can operationalize the new rules and contribute to the development of new, critical mindsets. While there is no blueprint for designing organizational structures that can promote the integration of processes and data among different agencies and different levels of government, a basic approach followed by the most advanced countries has been to reorganize institutions and organizations to establish appropriate horizontal and vertical workflows before starting an automation process.

The SDGs are highly integrated in the sense that there are complex interlinkages among the Goals and associated targets, and a whole-of-government approach is needed to ensure that organizational structures can coordinate and integrate public service delivery in ways that best serve the objectives of the 2030 Agenda.[35] While there is a general awareness of the need to address the synergies, trade-offs, and interlinkages among the SDGs, the implementation of integrated approaches to service delivery and efforts to strengthen policy coherence have not been the same across countries. In practice, achieving integration and policy coherence is difficult, not least because existing institutional arrangements may impede progress in these areas. Understanding how to adapt organizational structures to effectively address existing linkages among the SDGs is critical to achieving progress.[36] In their voluntary national reviews of progress made in the implementation of the 2030 Agenda, a number of countries indicate that they have set up or revamped institutional arrangements for SDG implementation to facilitate integration. For example, Germany has revamped its Council for Sustainable Development; Estonia, Morocco and France have set up interministerial committees or task forces to monitor SDG implementation; and Norway, Samoa and Sierra Leone have strengthened mechanisms for enhanced institutional engagement with local authorities.[37] These new structures should both support and be supported by the integrated use of digital technologies. New and emerging technologies can be deployed to help make sense of enormous quantities of data to identify synergies and trade-offs among different SDGs, which can potentially improve policy coherence and service delivery. Better data mining and machine-learning techniques can help predict the impact of specific policy choices in areas such as climate, land use, and water.

In terms of organizational set-ups, countries that are among the top performers in digital government usually have in place a central coordinating agency with budgetary autonomy to manage the national digital strategy and the national website team and to define and coordinate the functions of the chief information officer (CIO) or the equivalent. This agency is usually located within the highest decision-making body in government (the Office of the President or the Prime Minister's Office) or receives a robust mandate from it. Several countries have put such organizational structures in place. According to the 2020 MSQs, 145 of the 193 Member States have a CIO or the equivalent. Several countries have also established a network of CIO focal points within strategic institutions linked to the coordinating agency at both the national and local levels. In Colombia, for example, where digital transformation has been identified as a national priority, there is a CIO network across all agencies.[38] Having CIOs share their knowledge with public officials can help strengthen digital capacities. In India, for example, a Chief Information Officers Programme has been set up to create e-governance champions within line ministries and line departments; the objective is to accelerate the implementation of e-governance initiatives across all levels of government.[39] A number of new offices have also emerged over the past several years to keep up with technological advancements. Chief data officers and data protection offices or units are becoming increasingly important for the effective management of data-driven government transformation (see chapter 6). Some countries have chief innovation officers, particularly at the local level.[40] The most digitally advanced countries have put in place councils or advisory groups to facilitate collaboration at the ministerial level; among these are the Swedish National Digitalisation Council, the Australian Digital Council, and the Digital Economy and Digital Inclusion Ministerial Advisory Group in New Zealand. Many countries have

made their organizational processes adaptable to rapid technological changes. Organizational agility and risk management are at the core of effective digital government transformation. The Pitch Gov programme in Brazil makes traditional procurement processes agile by providing technology start-ups access to government data sets so they can co-develop proposals and test solutions.[41] Growing cybersecurity concerns are compelling Governments to embed risk management (including mitigation and contingency strategies) in their organizational processes. In the United States, the Defense Advanced Research Projects Agency's Cyber Assured Systems Engineering programme is developing tools that will allow computer systems to recover from cyberattacks and continue to perform their functions.[42]

Capacities are needed to promote coordination at the organizational level to enable different government ministries and agencies to effectively communicate and exchange information. Increasing the capacity of government agencies to communicate effectively within and outside of government is essential for enhanced collaboration for policy coherence and service delivery in diverse areas such as health, education, disaster risk reduction, and national security. Effective coordination, communication and collaboration can be leveraged to achieve government interoperability, which may be defined as "the mix of policy, management, and technology capabilities (e.g., governance, decision-making, resource management, standards setting, collaboration, and ICT software, systems, and networks) needed in order for a network of organizations to operate effectively".[43] Interoperability "is a top priority today as Governments try to integrate services across departments so as to improve effectiveness as well as efficiency".[44] As mentioned above, many countries are providing digital services through a single government website; box 7.3 shares some good practices and illustrates how interoperability supports the kind of dynamic interaction and agility needed to keep these portals well-integrated and relevant.

The National Information Resources Service in the Republic of Korea was established to integrate the information of central government institutions. The Service is responsible for the operation and management of 1,230 digital government services linked to 45 central government institutions and controls about 45,000 government information resources (see box 7.4).

Governments establishing new organizational structures and processes will also need to transform the organizational culture at all levels. An organizational culture that values collaboration, synergy, teamwork and partnerships and that emphasizes value delivery is a key success factor in any digital government transformation.[45] Often, one of the critical challenges after new organizational set-ups are in place is the reluctance of public officials to collaborate. A situation analysis might reveal that there are no networking incentives or that senior managers see information as power and are averse to sharing. It is not difficult to ascertain when public officials are unwilling to cooperate; it might be that they are not ready to exploit the potential of innovation and digital technologies to improve public service delivery. It is essential to create an organizational culture in which innovation is embraced and actively pursued. Innovation must be promoted with a clearly defined purpose, and the Government should provide incentives that benefit both the public and private sectors and encourage partnerships and collaboration; for example, the Government can implement policies that stimulate start-ups for innovation, adopt e-business strategies to facilitate the streamlining of business processes and high value-added services (including through mobile applications), and establish an enabling ecosystem for innovation. Creativity and innovation can be stimulated by an organizational culture in government that values openness and the sharing of data to guide strategic decisions. With the rapid evolution of digital technologies, it is essential to have in place a forward-looking organizational culture that promotes continuous learning through online and face-to-face training, staff exchanges, study visits and retreats within and between Governments. Providing induction courses for new public employees, introducing strong socialization mechanisms, identifying and leveraging champions of change and collaboration, and providing incentives can all help to promote organizational change.

Box 7.3 Characteristics of a strong single government website

The following are recommendations for designing, implementing and maintaining a strong single government website that is digitally well supported and user-friendly:

Have a single brand (such as GOB.MX) and use consistent brand elements such as the same logo and standard presentation across government institutions.

Use consistent design elements drawn from a shared style guide. Consistent does not mean permanent; design approaches should evolve as users' needs change.

Design to meet the needs of users, not government. User research is essential for building a website and digital services that are based on proven (not assumed) user needs and preferences. One idea might be to enable users to interact with content directly from a search engine by having a structured data markup for website content (which may enable richer snippets).

Allow data to guide website design and modification. Design, monitor and improve websites using data analytics—a essential tool for prioritizing areas for improvement that should be built in, always on and easy to read.

Make everything accessible to everyone. As outlined in the Government Design Principles in the United Kingdom, "accessible design is good design. Everything we build should be as inclusive, legible and readable as possible."

Design for user contexts. As an example, if users access government services or information from smartphones, personal computers or shared computers, the single government website should be designed to accommodate these options.

Avoid duplicating content. This means shutting down old government websites.

Keep it open. Many single government websites use and reuse open source code and open web design elements; good practice is to share back code, designs, ideas and plans.

Have a clearly defined scope. It may be politically desirable to have some public sector entities—including regulators, arms-length bodies and complex operations such as the health service—not be part of the single government website. There should be clear criteria governing such choices so that decisions are not made on an ad hoc or case-by-case basis.

Maintain a resilient, adaptable team to continually manage the site. It is not uncommon for organizations to build a big new website and then fail to improve it or allow it to evolve over time. For a single government website to be sustainable, it will need a team to constantly improve and clean up content, keep site navigation simple and intuitive, and understand and respond to changing user needs.

Sources: Prepared by Mike Bracken, Emily Middleton and Angie Kenny of Public Digital (United Kingdom).

7.5.3 Capacities at the individual level

Public servants are at the forefront of public service delivery and play a key role in ensuring national ownership and achievement of the SDGs. New individual capacities at all levels of government are needed for the design and implementation of holistic, integrated, coherent and evidence-based policies and services that leverage new technologies. Individual capacities are the beliefs, mindsets, values, attitudes, knowledge, skills and competencies of people. This subsection explains why it is necessary to develop capacities at the individual level for effective digital government transformation, what types of capacities are needed, and why it is critical for Governments to recruit and retain the best talent for digital government transformation. It also highlights the need for multidisciplinary teams in government and for safe spaces in which individuals can nurture innovation.

Box 7.4 Republic of Korea: National Information Resources Service

The National Information Resources Service (NIRS) is the world's first pan-governmental data centre responsible for integrating and managing the data and information of central government institutions. Consolidating information resources once separately managed by individual government departments in one centralized place, NIRS was set up to address challenges associated with the operation of isolated information systems, including the inefficient use of information resources, duplication in ICT investments, the lack of IT expertise, and wide exposure to security risks. The four main functions of this government-wide data centre are as follows:

(1) integrating, operating and managing 1,230 digital government services linked to 45 central government institutions and controlling about 45,000 government information resources, including servers and storage;

(2) consolidating and retrieving information through the government-exclusive G-Cloud to facilitate interdepartmental information sharing and optimize resource utilization;

(3) operating Hye-An, the pan-governmental big data portal, for all government officers to support science- and data-driven government policymaking; and

(4) protecting national information resources against cyberthreats through an integrated security management system using artificial intelligence technologies.

Sources: Republic of Korea, National Information Resources Service (www.nirs.go.kr).

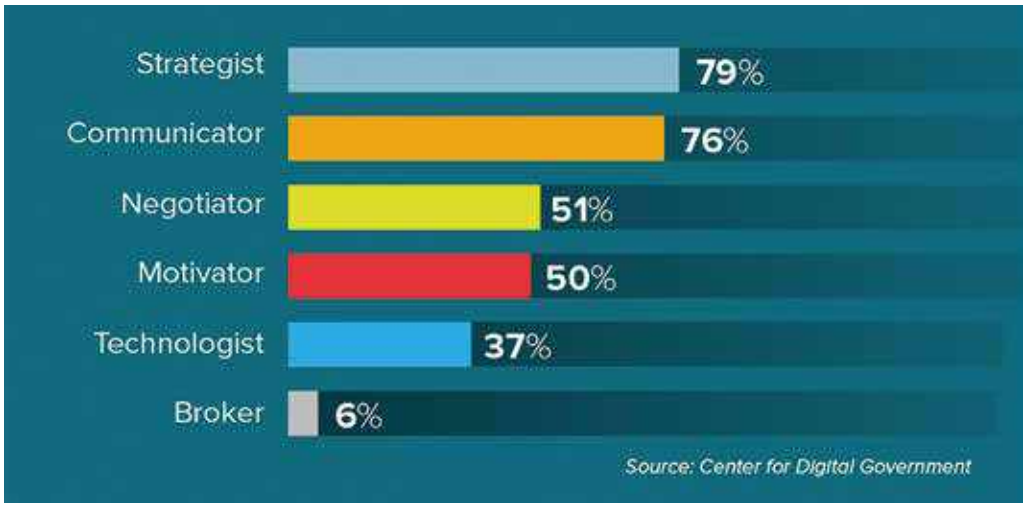
Institutional and organizational reforms are likely to be ineffective unless public officials and all stakeholders in society internalize the beliefs, norms and values that underlie the new institutions and organizations being put in place. Changing mindsets and behaviours is just as important as changing laws and regulations. Indeed, the first pillar of the road map for digital government transformation is strengthening transformational leadership and digital capacities and changing mindsets within government and across society.

There is a growing gap between the skills of public sector employees and the skills of private sector employees, with the former often lacking twenty-first-century competencies such as digital skills, data literacy, the ability to solve problems using systems thinking, and the capacity to anticipate future scenarios and pursue innovation. Individual capacities are needed in the public sector to ensure that those working in government can understand the complex interactions and trade-offs characterizing the SDGs, envisage different policy scenarios, consider long-term policy horizons, and have the capacity to design, implement and monitor integrated policies and services by leveraging digital technologies. The World Economic Forum has developed Transformation Maps, a dynamic knowledge tool that employs experts and machine-curated content to make sense of interlinkages among complex issues and support policymakers in making more informed decisions.[46] Public servants need to have the capacity to work across different government departments and with other State institutions, and they need to be able to raise public awareness and involve civil society and other stakeholders in governance processes. New attitudes, skills and behaviours are needed for interaction with vulnerable groups and to engage individuals and administrators at various levels of government in the localization of the SDGs. The foresightedness to anticipate problems, the flexibility to quickly adapt to and address unanticipated circumstances, and the resilience to mitigate risks are central features of any government transformation. Following an assessment of existing government capacities at the individual level based on the situation analysis, it is necessary to identify which new capacities are required to implement a country's digital government transformation strategy. In many cases, the most urgent priority will be the development digital capacities, which in government generally refer to the competencies, skills, knowledge and practical experience needed to use technologies in creative ways to better respond to people's needs.

Recruiting, retaining and motivating the best digital talent for digital government transformation

Securing the best digital talent and a multidisciplinary team of experts in government is vital. Without a strong core team of specialists possessing a wide range of digital capacities—including data scientists, cloud architects, privacy and cybersecurity experts, innovation specialists with knowledge of cutting-edge technologies, AI experts and behavioural analysts—any attempt to embark on a digital government transformation journey is likely to fail. Digital government projects may be rolled out, but if there is no internal capacity to sustain them, they will soon become obsolete or vulnerable to outside hacking. Leveraging frontier technologies largely depends on the digital capacities of government in data collection, storage, analysis and management. Capacities to ensure proper data management, including the ability to share data in an organized and structured manner, are relevant for Governments that are making their data available to the public through open government data initiatives. Capacities to effectively collect and use disaggregated data from various sources and sensors will be essential to providing personalized and people-friendly services, particularly for vulnerable groups. Ensuring the appropriate use of data is going to be one of the greatest challenges in digital government transformation (see chapter 6). Implementing an effective data strategy requires a chief data officer. In some countries, traditional CIOs are being replaced by experts with highly specific job profiles. In others, the CIO position is being redefined, as the skills and competencies CIOs need in the digital age extend far beyond technological knowledge; well-rounded and visionary professionals are needed. A survey conducted in 2019 by the Center for Digital Government reveals that in order to succeed today, a CIO needs to be a capable strategist, communicator, negotiator and motivator; the role of technologist comes in near the bottom of the list of required qualities (see figure 7.4). Since changes in the digital landscape are occurring at such a rapid rate and technology deployment can potentially have irreversible consequences, Governments need to develop forecasting capacities to enable them to anticipate and address possible negative consequences and determine what skills might be needed in the future. Improved selection processes and training are needed to support digital government transformation. The recruitment process should include not only the Government's human resources (HR) department but also ICT specialists, including analytics experts. Another critical issue is that of developing new HR strategies for building and effectively deploying an augmented workforce in the public sector.

Figure 7.4 The most important leadership traits of chief information officers today



Source: Tod Newcome, "What are the most important traits of CIOs today?" Government Technology, Analytics (June 2019), available at https://www.govtech.com/analytics/What-Are-the-Most-Important-Traits-of-CIOs-Today.html.

Developing digital capacities within government and changing mindsets

The Government must be able to attract and maintain a core pool of digital expertise and ensure that digital skills are embraced across all levels of government. Changing mindsets, including beliefs and attitudes, is one of the most difficult challenges in implementing a digital government strategy. In its work on a competency framework for public servants to achieve the SDGs, UN DESA has identified evidence-based, digital, and collaborative mindsets and associated competencies as critical to moving forward with the realization of the SDGs (see figure 7.5). The digital capacities public servants and capacity developers need to acquire will continually evolve with the progressive incorporation of new ICT and frontier technologies.

Figure 7.5 Critical mindsets in the digital age

MINDSETS AND COMPETENCIES

EVIDENCE-BASED MINDSET

An evidence-based mindset is vital, as it allows public servants to base policy development and decision-making on proven evidence, sound data, and established research. One key competency of those with an evidence-based mindset is data literacy, which reflects the capacity to locate, retrieve, analyse and utilize data and information for problem-solving. An evidence-based mindset and data literacy support the achievement of SDG target 16.10, ensuring public access to information and protecting fundamental freedoms in accordance with national legislation and international agreements. These capacities can also be critical for ensuring the effective use of policy screening tools to support risk-informed decision-making.

DIGITAL MINDSET

An innovative digital mindset allows public servants to conceive of new and different ways ICT can be leveraged to improve processes and develop creative solutions. Those working in the public sector today must be willing and able to use rapidly evolving new technologies. They need to understand how these technologies can contribute to digital government transformation and must be able to identify relevant risks and limitations. Since new digital skills are regularly needed as technologies evolve, it is important that public employees have a digital mindset that allows them to be digitally "nimble" and ready to embrace change. Digital skills and competencies are needed to design and deliver services with end-users in mind.

COLLABORATIVE MINDSET

Public servants need to have a collaborative mindset that will allow them to identify issues of common concern and to pursue dialogue, coordination, partnerships and networking to address those issues. One of the competencies linked to the collaborative mindset is cooperation. Public servants need the knowledge and skills to apply an integrative whole-of-government and whole-of-society approach to work across silos and to facilitate network-based governance.

Source: Tod Newcome, "What are the most important traits of CIOs today?" Government Technology, Analytics (June 2019), available at https://www.govtech.com/analytics/What-Are-the-Most-Important-Traits-of-CIOs-Today.html.

In engaging personnel for digital government transformation, excessive reliance on vendors or private sector expertise should be avoided, as the Government might lack the capacity to follow up on problems that arise in the implementation phase. Although international cooperation and support are desirable and often necessary, skills and knowledge should be locally sourced whenever possible. Some countries, such as Singapore, provide competitive salaries and favourable working conditions in the public sector in order to attract and retain world-class professionals. The country's Government Technology Agency (GovTech), which is part of the Smart Nation and Digital Government Group within the Prime Minister's Office, operates as a company, harnessing digital technology to develop and deliver digital products and services to people, businesses and the Government as part of the public sector digital transformation process. It recovers innovation costs by including them in product pricing, which is approved by the Ministry of Finance.[47] It is crucial to secure a high ratio of IT specialists to other types of expertise in government and to take on quality personnel. Procuring the most talented and capable professionals requires flexible recruitment rules and pay scales that are compatible with the private sector. It is also vital to ensure that government ICT users who do not have an in-depth knowledge of digital technologies are provided with the necessary resources and support to develop new competencies and make effective use of these technologies in their day-to-day work.

Creating multidisciplinary and multisectoral teams

Building strong teams and communities of practice can help foster better information sharing. Proof of this can be found in Australia, where the Digital Transformation Agency provides free training to assist government teams in understanding and meeting the Digital Service Standard. The Agency is currently "working on a Building Digital Capability program with the Australian Public Service Commission. The program will attract digital talent to the Australian Public Service, create clear career pathways, help managers create digital teams, and inspire leaders to take a visionary approach to creating digital services." The Agency also organizes "communities of practice that bring together people working in government to share ideas, show their work, solve problems and explore best practice".[48] As part of its efforts to ensure no one is left behind, the Government has put in place coaching and mentoring programmes for women to strengthen their digital role in government.

Ensuring safe spaces for innovation and experimentation

It is critical to ensure that individuals and teams working in the public sector can avail themselves of safe spaces for innovation and experimentation where collaboration with the private sector and civil society is possible and where risk-taking is not only allowed but encouraged. It is important to share experiences and lessons learned from countries that have successfully accelerated government innovation. In Denmark, the "Government supports a GovTech program to help tech startups deliver new solutions to create public sector value", and the Government of Finland has created a culture of experimentation with the launch of "a digital platform called Kokeilunpaikka (meaning 'place of experiment') to encourage citizens to learn about experiments and also design their own".[49] Singapore has put in place a Smart Nation Fellowship Programme.[50]

A plan to develop individual capacities for digital government transformation

The key elements of a plan to develop capacities at the individual level for digital government transformation are as follows:

- Strengthen leadership capacities and the commitment to digital government transformation.
- Enhance the understanding of digital trends and strengthen the digital literacy and digital competence of senior and middle-level government officials to enable them to manage the digital transformation process.
- Enable the development of new mindsets and competencies through ongoing training.
- Create multidisciplinary and multisectoral teams.
- Attract and retain the best digital talent in the country through competitive remuneration, incentives and innovation programmes.
- Design entry-level programmes to attract young talent.
- Develop clear career development paths and engage in proper succession planning.
- Ensure that there is a high ratio of ICT experts to other experts in government.

7.5.4 Developing the capacities of capacity developers

A wide range of education providers should be involved in sustainable capacity development. Capacity developers may include schools of public administration, management development institutes, or non-State actors such as private sector software developers. This subsection emphasizes the importance of developing the capacities of capacity developers and provides a few examples of relevant capacity development initiatives.

Institutes and schools of government and public administration are uniquely positioned to play a key role in strengthening the skills and competencies necessary for the implementation of the 2030 Agenda. Schools of government provide training for public servants of all types and at all levels. They are involved in setting up research programmes for public administration and public policy and can provide technical assistance to public administrations (including HR managers) in the implementation of reform and innovation programmes. Institutes of public management and schools of public administration play a central role in developing curricula that provide current and future public servants with the requisite skills, mindsets and competencies they will need for effective governance. Working with a number of different schools of public administration, UN DESA established a global initiative focused on equipping public servants with the capacities to implement the SDGs (see box 7.5).

Box 7.5 UN DESA: global initiative focused on equipping public servants with the capacities to implement the SDGs

"The overall purpose of the initiative is to develop the capacities of public servants (in terms of knowledge, skills, attitude, leadership competencies and mindsets) to support the implementation of the SDGs, provide data and information about [the] development of capacities in various regions, and support institutional capacity development for improved public service delivery as well as North-South and South-South exchange of effective governance practices to ensure cross-fertilization and mutual learning." Through the initiative, UN DESA "is engaging with schools and institutes of public administration to mobilize and equip public servants for implementing the 2030 Agenda … as well as developing and updating their curricula to reflect the SDGs and the key principles and objectives of the 2030 Agenda." The overall purpose of the initiative is to develop the competencies public sector leaders and public servants require to effectively support the achievement of the SDGs. Through this initiative, the UN DESA Division for Public Institutions and Digital Government was able to provide technical assistance to 57 institutes and schools of public administration in Africa, Asia and the Pacific, Central Asia and Latin America, enabling them to provide targeted capacity development and training to more than 2,000 government officials from around the world. This initiative has facilitated the provision of purposeful training that highlights the critical importance of changing the mindsets of public servants in order to achieve the SDGs.

Sources: United Nations, "Calendar—events: Building Capacity of Training Schools and Institutes of Public Administration for the SDGs" (2019) (https://publicadministration.un.org/en/news-and-events/calendar/ModuleID/1146/ItemID/3025/mctl/EventDetails).

Digital Kazakhstan, as part of its mandate to support the evolution of human capital assets in government, coordinates ongoing programmes that provide civil servants with digitalization training that can then be used to develop the ICT skills and digital competencies of government employees (see box 7.6). These programmes are designed to continually train and educate capacity developers and public servants on the ever-increasing array of ICT applications and provide them with the digital skill sets considered essential to their development to enable them to improve public services. At the core of the programmes are cross-sectoral and public-private partnerships that allow relevant experts and stakeholders from government organizations, international non-governmental organizations and multinational corporations to work together to strengthen capacity development through co-innovation, teaching and dialogue.

7.5.5 Strengthening digital capacities at the societal level to ensure that no one is left behind

Digital government capacities and capacity development for the achievement of the SDGs are inextricably linked to the capacities of all stakeholders in society. Ensuring that no one is left behind is the overarching principle of the 2030 Agenda. As highlighted by United Nations Secretary-General

Box 7.6 Digital Kazakhstan: providing civil servants with digitalization training

Key to the success of any government digitalization effort is building the capacities of those who train and educate the users of ICT-based programmes. Digital Kazakhstan coordinates ongoing training programmes that strengthen the capacities of chief digital officers and IT specialists at all levels of government to provide government employees with the ICT skills and support they need to contribute to digital government transformation. The training workshops focus on economic sectors, new technology trends and project management skills. So far, civil servants have been able to participate in training programmes at Nazarbayev University in Kazakhstan, the Academy of Public Administration under the President of the Republic of Kazakhstan, the e-Governance Academy in Estonia, and the e-Government Leadership Centre in Singapore. Central to this programme of continuing education is the commitment to building the capacities of capacity builders through public and private partnerships. The objective is to ensure that individual digital government experts and leaders internalize and are able to develop in others the strategic mindsets and competencies for today and the future. Transformational leadership must be developed at the individual level so that public servants possess the skills and strategies needed to address rapidly evolving and increasingly complex issues and can also build digital, institutional, organizational and societal capacities.

Sources: United Nations Public Service Awards database (https://publicadministration.un.org/en/UNPSA); Digital Kazakhstan, "About the program"(https://digitalkz.kz/en/about-the-program).

António Guterres, leaving no one behind means "listening to the views and guidance of people living in poverty and acting together with them".[51] In every country, vulnerable groups—typically youth, women, older persons, migrants, indigenous peoples, persons with disabilities, minorities, and the poor—confront barriers that prevent them from fully participating in their nation's political, economic and social life. These groups are excluded through practices that discriminate against people based on their gender, sexual orientation, race, ethnicity, income level or disability status. Such practices can rob them of dignity, security and the opportunity to lead a better life. This subsection analyses the critical role of developing capacities at the societal level and how Governments can promote digital inclusion.

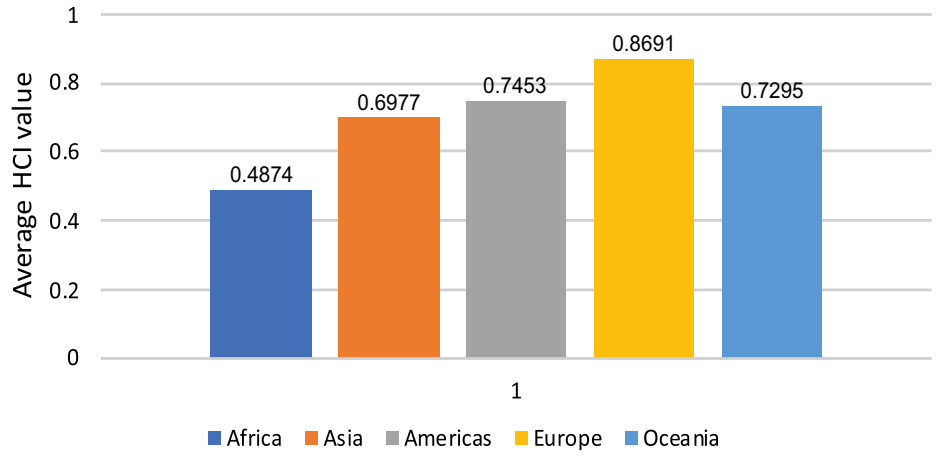
Digital capacity development is a significant undertaking because all actors in society must be equally empowered. The United Nations World Social Report 2020: Inequality in a Rapidly Changing World emphasizes that "the potential of new technologies to foster sustainable development can only be realized … if everyone has access to them. Regrettably, new technologies are reinforcing various forms of inequality and creating new 'digital divides'."[52] Developed countries and least developed countries are not at the same level in leveraging digital technologies for e-government. People living in rural areas may be at a greater disadvantage than people living in cities, including in the use of digital technologies to access and use government services. Those with relatively high incomes that can afford to pay for digital technologies, devices and connectivity have greater access to government services than do those with lower incomes. The digitally illiterate population is also unable to take advantage of the benefits of digital government.

Digital capacities for co-creation and cooperation in public service delivery can be developed in many ways, including through civil society hackathons, awareness-raising workshops, targeted training, and informational meetings with an array of stakeholders. These types of collaboration increase societal capacities and buy-in. According to its 2020 MSQ, the United Arab Emirates has managed to increase digital government usage by inviting people to participate in the design of public services, providing incentives such as gamification options and 24/7 customer support.

To promote digital inclusion and ensure that more people can navigate the Internet and benefit from government services, many Governments are prioritizing the provision of opportunities for digital

literacy development. While digital skills and competencies can be acquired through targeted training at any age, they should ideally be developed within the context of a broader quality education so that children and youth can benefit from early exposure and experience. Unfortunately, the level and quality of education is still relatively low in some world regions. According to the 2020 United Nations E-Government Survey, Africa is the region with the lowest average Human Capital Index (HCI) value; Europe continues to have the highest HCI value, followed by the Americas, Oceania and Asia (see figure 7.6).

Figure 7.6. Average Human Capital Index values, by region



Source: 2020 United Nations E-Government Survey.

While Africa continues to face challenges in human capital development, there are steps being taken in parts of the region to strengthen digital literacy and education. Efforts undertaken in Zambia constitute a good example of how a Government has invested in the capacity development of its people. Through the iSchool Zambia initiative, the Government has facilitated the development and dissemination of a public-private ICT-based "home-grown" educational programme. Learning materials in English and vernacular languages have been produced, along with lesson plans, teacher training materials and student reading books. Targeted schools receive tablets with training materials and solar-power equipment (if needed). Smart centres—local Internet-café-style facilities set up to encourage community engagement—serve as satellite communications facilities and provide digital access. This is enhanced by low-cost rural connectivity, data analytics and off-grid power.[53]

Developing capacities for digital government must be purpose-driven and pursued with the intention of bridging gaps among different societal groups and regions. In Argentina, the Digital Agenda has a whole chapter dedicated to education and digital inclusion, incorporating initiatives aimed at strengthening people's digital literacy skills and bridging the digital divide.[54]

To bridge the digital divide, Governments can make Internet access more affordable, provide multiple channels to access services, and deliver user-friendly online content. Many countries have already taken steps to expand avenues of access to government information and services. For example, vulnerable groups in 166 countries can access online services in more than one official language. In 91 countries, free access to online government services is offered through kiosks, community centres, post offices, libraries, public spaces, and free Wi-Fi. Increasingly, people around the world are using their mobile phones for transactions with the public sector. Many countries use short message service (SMS) and mobile applications to deliver government services. The United States Government is setting up mobile-first strategies whereby the compatibility of service delivery with mobile devices is given priority.

Other ways to narrow the digital divide are to offer user-friendly content that is easily accessible and to provide adequate user support. Self-service kiosks, one-stop shops, online video and audio tutorials, user-friendly interfaces, and help-desk support through live chats and face-to-face interaction benefit all users but can be especially valuable for vulnerable groups. In 59 countries, the national government portal offers live chat support functionality; in 107 countries, the portal offers guidance or tutorials to enable individuals to understand and use online services; and in 107 countries, a "help" link is available. In 140 countries, the national portal provides information on both online and offline payment options for government services.

It is essential to raise awareness through effective public communication campaigns both to inform people of the benefits of digital services and to ensure more widespread use of online platforms. If people are not aware that government services are provided online, they will not use them. As part of its digital government transformation strategy, Mauritius has made an infographic available to help people better understand the value of digital government and how it can benefit them.[55] Through the Digital India initiative, the Government has produced resources such as banners, public campaign materials, videos for television, and materials for face-to-face information sessions with people. According to the 2020 MSQ for Canada, the country's Policy on Communications and Federal Identity ensures that communication with the public is carried out through a variety of media and platforms in order to maximize reach and explore innovative ways to use technology. Government departments inform the general public about e-government services through Twitter, Facebook and LinkedIn; as an example, the team responsible for developing a new payment system for the Treasury Board of Canada Secretariat used Twitter to announce the changes and to actively connect with and engage the general public. The aforementioned Policy[56] circumscribes the Government's use of social media. The Privacy Commissioner of Canada provides online resources, including tips for using social media sites that outline privacy implications for both employees and employers within the Federal Government.

People will be reluctant to use digital government services and engage in e-participation if they do not trust the Government, digital technology, and the system that integrates the two. Governments must demonstrate that they can be trusted with the data people provide and that their interaction with the public can produce meaningful change (see chapter 5). They need to show that they are credible in terms of providing safe and consistent access to services, promoting digital literacy, and enabling the participation of all groups in society, particularly the most vulnerable.

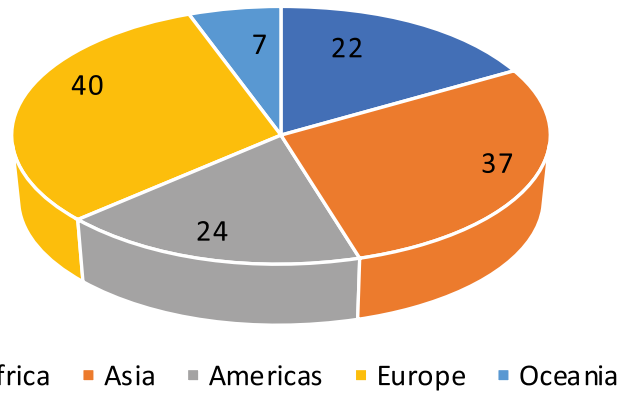
Digital divides and vulnerable groups

Although digital divides remain pervasive, a growing number of countries are providing specific online services for vulnerable groups (see chapter 1). Europe is the region with the largest number of countries offering at least one service for vulnerable groups, followed by Asia, the Americas, Africa and Oceania (see figure 7.7). The 2030 Agenda and other development initiatives will succeed only if the rights of vulnerable populations are explicitly acknowledged and protected.

Youth

Youth engagement with local and national governments in delivering on development policies and programmes is critical to the success of the 2030 Agenda. As underscored at the 2019 Economic and Social Council Youth Forum, the failure to foster inclusive youth development and protect young people's rights can reinforce inequalities—with long-term economic and social consequences. The creation of decent jobs through multistakeholder partnerships, including public-private partnerships, is critical to empowering youth and promoting inclusion and engagement. As part of the ITU-ILO Digital Skills for Decent Jobs for Youth Campaign, ITU has developed a Digital Skills Toolkit that

Figure 7.7 Number of countries with at least one service for vulnerable groups, by region



Source: 2020 United Nations E-Government Survey.

"provides policymakers and other stakeholders with practical information, examples, and step-by-step guides to help develop a national skills strategy". The Toolkit reflects the commitment of the international community to tackle youth unemployment and the recognition that digital skills are essential to everyday life and work in modern society. The Digital Skills Toolkit publication offers a checklist for developing a national digital skills training programme, provides an overview of digital skills, presents a range of stakeholder models that can inform the development of a digital skills strategy, furnishes guidance on inventorying existing policies and programmes, and outlines specific strategies for the development of digital skills.[57]

Persons with disabilities

Persons with disabilities comprise an estimated 15 per cent of the world population and often remain marginalized and excluded from social participation and public services due to physical barriers. Persons with disabilities regularly encounter discrimination that is manifested in pervasive exclusion from development initiatives, economic opportunities and social services in areas such as employment, education, transportation and health care. The 2030 Agenda explicitly calls for the inclusion of persons with disabilities and has opened the doors for their participation and recognition as active, contributing members of society who must not face any discrimination or exclusion or be left behind. Mainstreaming disability and including persons with disabilities in policy formulation and implementation and in the design, delivery and utilization of public services constitute an important step in promoting social inclusion to advance the SDGs.

According to ITU, more than a billion people live with some form of disability, and 80 per cent of them reside in the developing world.[58] The provision of online services catering to the needs of persons with disabilities varies widely; 148 countries have government portals integrating responsive web design, while only 71 have national portals that are accessible for persons with disabilities (in line with W3C guidelines). The United Nations Educational, Scientific and Cultural Organization (UNESCO) has established a programme in the Caribbean for improving accessibility for youth with disabilities through ICT. The aim is to build ICT capacities both in infrastructure and among people with disabilities in order to prevent their marginalization from society. The accessibility programme is designed to be sustainable, as youth with disabilities not only constitute the target beneficiaries but are also incorporated into programme development, training and propagation. Through cooperation with various regional institutional supporters in 18 countries, UNESCO has sought to develop the capacities of individuals to provide software and hardware that facilitate the inclusivity of youth with disabilities. This is a robust capacity development programme for youth that is proactively engaged

in fighting social exclusion, discrimination and violence targeting persons with physical disabilities. It is also designed to be culturally relevant, as local beliefs, value structures, and social and cultural norms have been taken into account in programme design and implementation.[59] In China, online services have been put in place that offer persons with disabilities an easy way to apply for assistive devices (see box 7.7).

Box 7.7 China: online services for persons with disabilities

In China, e-government development has helped strengthen policy integration, improve the quality of public services, and increase government transparency. In April 2016, China released its National Plan on Implementation of the 2030 Agenda for Sustainable Development, which lays out specific plans for the implementation of the 17 Sustainable Development Goals and associated targets. In 2018, the State Council issued guidance on accelerating the establishment of a nationwide online government services platform and further promoting "Internet + government services" to optimize the business environment, bring convenience to enterprises and people, stimulate market vitality and social creativity, and build a service-oriented government people are satisfied with.

Within this people-centric government services framework, particular attention is being given to vulnerable groups. For example, to address the needs of persons with disabilities, Beijing has made continuous efforts to improve social security and public services systems by promoting innovative online applications. One of these is a special application that allows persons with disabilities to apply for assistive devices directly from the government website. Assistive device services are provided to all certified persons with disabilities who have a Beijing household registration, so there is no need to submit certification of disability when accessing such services. Persons with disabilities can get at least 50 per cent of the relevant subsidy for purchased auxiliaries on the service platform; those who receive a subsistence allowance, those who have a low income, no income or are unemployed at working age, children under 16, and students above the age of 16 are entitled to a 100 per cent subsidy. The application is made simple; persons with disabilities only need to sign in on the Beijing Persons with Disabilities Online Service Platform or Beijing Municipal Administrative Service Center website at home and submit their applications online. After the platform automatically identifies the candidates and the corresponding subsidy through data sharing, the administrative departments complete the examination and approval process online. The auxiliary products can be purchased on the Internet to satisfy practical needs and are delivered to people's homes in about a week. This process eliminates all certifications and intermediate procedures and enables persons with disabilities to undertake all transactions from home.

Sources: China, E-Government Research Center, Party School of the Central Committee of C.P.C (National Academy of Governance) (https://www.ccps.gov.cn/bmpd/dzzzw/).

Older persons

The United Nations Development Programme (UNDP) issue brief on ageing, older persons and the 2030 Agenda for Sustainable Development emphasizes the importance of engaging older persons in the process of sustainable development; "in view of their experience, knowledge and skills, older persons are important actors in communities, making key contributions" in the areas of economic development, unpaid care work, political participation and social capital.[60] Older persons must be given careful consideration in the design of public service delivery models and the provision of government services. The lack of convenient access to social services through online portals or service centres can reinforce their exclusion and keep them on the wrong side of the digital divide. Older persons can benefit enormously from many of the new technologies available, including those used for the provision of public services, but action must be taken to strengthen their digital skills and ensure that they have access to the Internet. More broadly, Governments need to identify and address the specific challenges faced by older persons so that no one is left behind.

The most recent Survey results indicate that the number of countries offering services to older persons increased from 128 in 2018 to 152 in 2020. In Singapore, the Government launched the Silver Infocomm Initiative to integrate older persons into the digital community and help bridge the digital divide (see box 7.8).

Box 7.8 Singapore: Silver Infocomm Initiative

Singapore is a world leader in broadband speed and access, but many of the country's older residents do not use ICT or the Internet and are therefore digitally marginalized. Through the Silver Infocomm Initiative, the Government has established a set of programmes that provide older persons with digital information and skills they can apply in the real world. The Initiative comprises four key components: awareness, skills, access points and usage. A comprehensive curriculum has been developed that includes learning materials and practical applications. iBEGIN modules provide participants with basic ICT skills such as using a computer, surfing the Internet, creating emails, sending instant messages, and making video calls, and users are taught how to protect themselves online. The iLIVE curriculum offers intermediate-level training, allowing seniors to upgrade their IT skills as they take on tasks such as learning how to make an online transaction, booking air-travel tickets, and using government e-services. The senior-friendly courseware covers almost two dozen topics, and step-by-step guidance is available in both Chinese and English. Older persons can sign up for virtual classes (Silver Pods) or attend courses in person at one of the 12 Silver Infocomm Junctions (senior-friendly learning hubs) or one of the dozens of PA Senior Academies around the island. For those seniors who are ready to take their digital skills to the next level, the Silver Digital Creators suite offers five courses designed to bolster creativity skills; those who successfully complete the courses in digital photography, movie-making, digital music and art, coding, and book authoring receive an Apple Regional Training Centre certification.

Sources: Singapore, Silver Infocomm Initiative (https://www2.imda.gov.sg/).

Gender

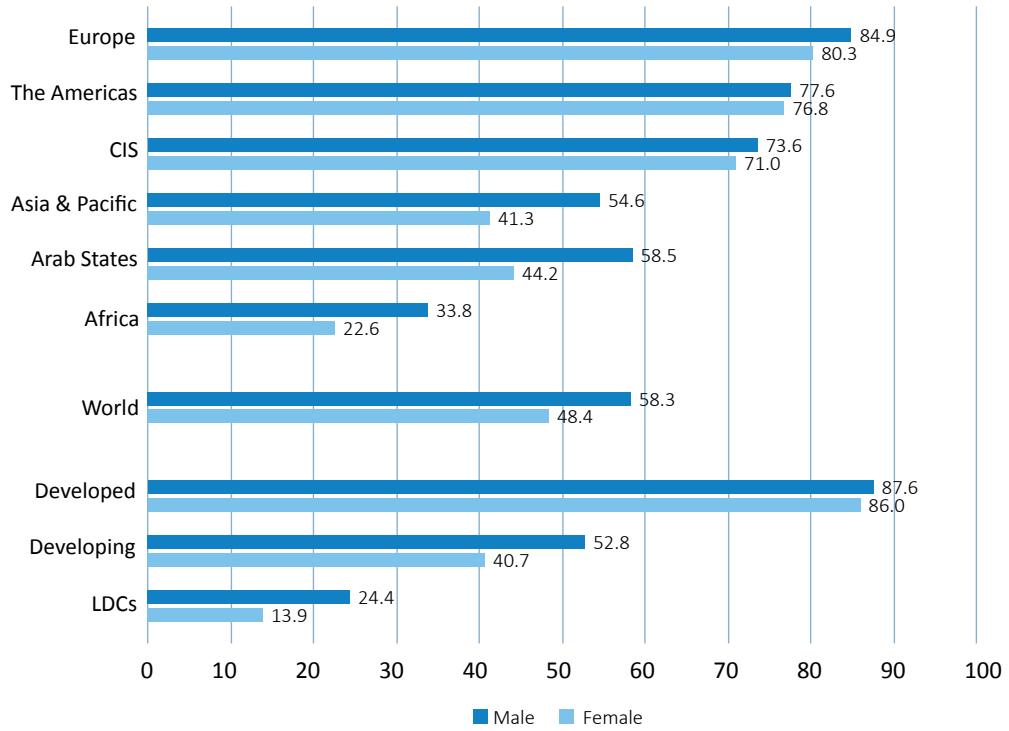
The full realization of the 2030 Agenda can occur only when women across the globe have achieved full equality and parity in political participation, leadership, and social and economic empowerment. Gender equality is a fundamental human right, but it is also a necessary foundation for a peaceful, prosperous and sustainable world. In many countries, women's rights are jeopardized or violated because of entrenched gender discrimination and limited access to social services and economic opportunities.

Though there have been significant advances in gender mainstreaming around the world, sizeable gaps remain within and between countries and regions. The number of women who can access the Internet in developed countries is more than double the number of those who can do so in developing countries. At the regional level, Europe has the highest proportion of women with Internet access (80.3 per cent), while Africa has the lowest (22.6 per cent); in terms of country groupings, the respective rates for developed, developing and least developed countries are 86.0, 40.7 and 13.9 per cent (see figure 7.8).

7.5.6 ICT infrastructure, affordability, security and access

A strong ICT infrastructure is a critical enabling factor for effective digital government transformation. Without affordable and widely available high-speed broadband Internet and safe and secure access to new technologies, Governments cannot effectively provide digital services and people cannot make use of them. Many Governments have started to move their services to the cloud. In Singapore, the Government announced in 2018 that some of its IT systems and resources would be moved to a commercial cloud, and within five years most of its systems would be moved.[61]

Figure 7.8 Internet penetration rates for men and women, by region or country grouping, 2019 *(Percentage of male or female population)*



Source: International Telecommunication Union estimates.

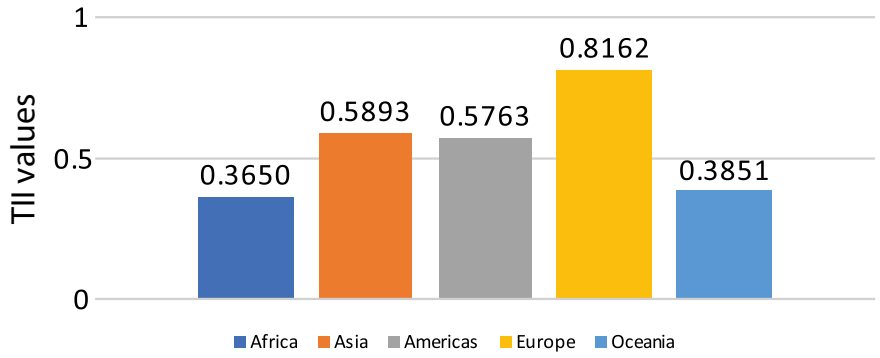
Note: Penetration rates reflect the proportions of women/men who have Internet access in the respective total female/male populations.

This new trend offers significant benefits but is not without risks. Cloud services can be particularly vulnerable to cybersecurity threats. Sensitive data stored in the cloud, including financial, public sector and health data, can be compromised through hacking or misuse. Protective measures that meet international quality and safety standards need to be put in place and updated as needed. Cloud security regulations should cover public and private cloud services, as confidential personal and government data are stored in both. Blockchain is being used in a growing number of countries as a security feature. The Monetary Authority of Singapore has been working with financial and non-financial institutions and with the central bank of Canada to pilot and scale a blockchain-based multi-currency payments network to facilitate faster, more cost-competitive and safer cross-border transactions.[62]

Connectivity is a critical concern for many digital government developers, as slow broadband (or no broadband) is still the norm in several parts of the world. ITU estimates indicate that while the number of Internet users worldwide increased between 2005 and 2019, half of the world is still not connected.[63] The region with the highest Telecommunication Infrastructure Index (TII) value in 2020 is Europe (0.82); the corresponding values for Asia and the Americas are just under 0.60, and those for Africa and Oceania are below 0.40 (see figure 7.9). The proportion of individuals with Internet ranges from 26.8 per cent in Africa to 82.4 per cent in Europe (see figure 7.10). These enormous gaps in ICT infrastructure and Internet access characterize what the world experiences as the digital divide.

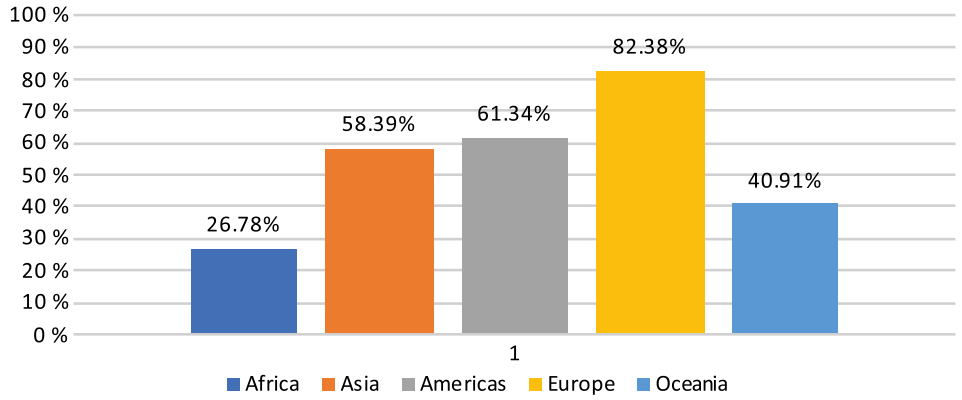
Since private Internet access is not possible in many contexts, Governments must expand public access options, including Wi-Fi hotspots in public spaces, Internet kiosks for services, and similar

Figure 7.9 Average Telecommunication Infrastructure Index values, by region



Source: 2020 United Nations E-Government Survey.

Figure 7.10 Percentage of individuals in each region using the Internet



Source: 2020 United Nations E-Government Survey.

alternatives. Such measures require significant public investment and will need to be funded from national budgets, though outside partnerships might ease the financial burden and also invite innovation. Digital collaboration is actually becoming a critical factor for success. Governments should actively pursue public-private, North-South, South-South and other partnerships to build digital capacities in all areas and at all levels in order to leverage new and emerging technologies for digital government development.

7.6 Capacities for continuous monitoring, evaluation and improvement

Since digital government is a journey and not a final destination, the continuous monitoring and evaluation of digital services is essential. Performance indicators can comprise both quantitative and qualitative measures that assess variables such as user uptake, user satisfaction, and the share of automated customer service generated by the digital government system. Where applicable and possible, data should be disaggregated by gender, age, disability status, setting (urban/rural), and other relevant factors to analyse outcomes for different demographic groups. Some countries have adopted a digital government implementation index to establish benchmarks for public institutions and monitor progress. An impact assessment methodology for evidence-based policymaking can help Governments evaluate progress in the medium term. In June 2008, the Government of Scotland updated its National Performance Framework to provide a unified structure for measuring sustainable,

inclusive growth and the well-being of citizens.[64] Keeping track of how digital government services are contributing to or can better contribute to the achievement of the SDGs is equally important. In 2018, the University of Oxford and the Global Change Data Lab launched the SDG Tracker to accurately monitor and measure progress towards the realization of each of the 17 Goals and related targets.[65]

The adoption of an iterative model that leverages usage statistics and public feedback on digital government services to inform continuous improvement is an essential component of evidence-based governance. Among the 193 Member States, 124 have a "leave feedback" function in their national portals; 125 allow people to file a complaint about public service delivery, and 139 publish the results of government procurement/bidding processes online. However, only 58 States provide evidence of user satisfaction with online or mobile services. Seeking user feedback is essential, but it is equally important to share the results; letting users know their voices are being heard and demonstrating how their input is guiding meaningful change strengthens transparency and promotes trust in the Government. SDG indicator 16.6.2 measures the proportion of the population satisfied with their last experience of public services, highlighting the importance of user satisfaction with government services provision. Capacities to use public feedback to improve services and programmes is part of a holistic approach to digital government transformation that values performance and sustained responsiveness.

7.7 Conclusions

- Digital government transformation is fundamentally about governance transformation and innovation as part of a country's overall development strategy and the pursuit of sustainable development. The process tends to be political in nature, with technology playing a facilitative role.
- A holistic approach to public service delivery that puts people and their needs first is required to harness the full potential of new technologies for digital government transformation and mitigate the attendant risks.
- Digital government transformation is actualized through a four-step iterative process that encompasses situation analysis (including an assessment of digital capacities within and outside of government), the development of a strategy and road map, implementation, and monitoring and evaluation for continuous improvement.
- A strong commitment to leveraging digital technologies for the well-being of all is needed at the highest levels across government and in all sectors of society for digital government transformation to be purposeful and successful.
- The use of digital technologies in government should support the overall national vision; a diagnostic analysis can help Governments identify the purpose of digital government transformation.
- The digital government strategy and the road map for digital government transformation should be built around key pillars, and all targeted priorities should be addressed holistically. Governments must put in place an institutional and regulatory ecosystem for the deployment of digital government, employ systems thinking and an integrated service model approach, and establish a central coordinating agency or mechanism with budgetary autonomy to manage the implementation of the national digital strategy and transformation road map. Priority should be given to recruiting and retaining the best talent in a country, developing critical mindsets, and promoting safe spaces for experimentation.
- Another essential priority in digital government transformation is promoting digital inclusion and ensuring that all people, including vulnerable groups, can access new technologies and e-government services to improve their well-being.
- Capacities that support effective digital government transformation are required at the societal, institutional, organizational and individual levels. Capacities for managing data, mobilizing

resources, and ensuring adequate ICT infrastructure and the availability of affordable and accessible technology and high-speed connectivity are equally important.

- Digital capacities at the societal level—including digital skills and competencies but also the appropriate values and norms—are critical for the uptake and continued use of digital services and for sustained digital participation.
- Government capacity for iterative feedback is needed to ensure continuous improvement.
- Digital government transformation can be understood as a journey of constant improvement in service of society's well-being, peace and prosperity

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8. Addendum - E-Government during the COVID-19 pandemic: Policy insights and the way forward

In this chapter:

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E-government has stepped up its central role as a necessary element of communication, leadership and collaboration between policy makers and society during the COVID-19 pandemic. Digital technologies have enabled broader sharing of knowledge, encouraging collaborative research to find solutions and provide transparent guidance to Governments and people. The same technologies have also been used for the rapid dissemination of false or questionable information, leading to concerns about privacy and security. Policy makers have been called upon to collect and process COVID-19-related data in an ethical, transparent, safe, interoperable, and secure manner that protects the privacy and data security of individuals. Overall, however, the benefits of using technology seem to have outweighed their drawbacks.

Digital government offices have also experienced rapid digital transformation during the COVID-19 pandemic. In a quick call for inputs by UN DESA, government officials around the world shared nearly 500 COVID-19 related applications[1] in less than 2 weeks. Moving forward, policy makers need to further embrace technology to support the achievement of the Sustainable Development Goals (SDGs). Efforts in developing digital government strategies after the COVID-19 crisis should focus on improving data protection and global digital inclusion policies as well as on strengthening the policy and technical capabilities of public institutions. At the same time, Governments need to strengthen common norms for knowledge sharing and collaboration beyond the COVID-19 pandemic.

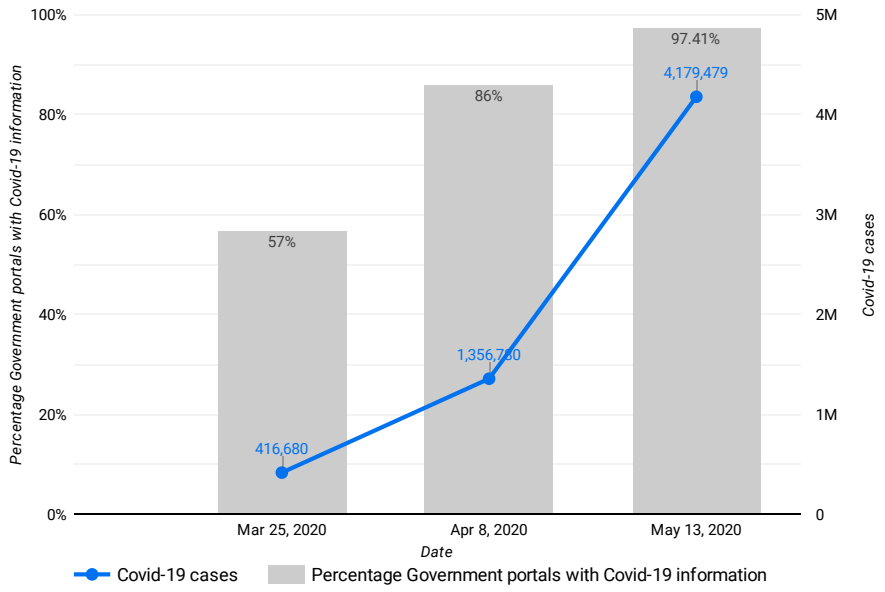
8.1 Sharing information

Information and communication technologies (ICTs) are vital to the health and safety of people, and in keeping economies and societies working during the ongoing COVID-19 crisis. Digital government technologies have kept Governments and people connected during the outbreak, either through information sharing or online services delivery. These technologies have, for example, helped Governments enforce stay-at-home measures by requiring movement permits from people through text messages, online applications or platforms. The use of technology has also enabled Governments to make rapid policy decisions based on real-time data and analytics, enhancing the capacities of national and local authorities to better coordinate and deploy evidence-based services to those who need them most.

The vital need for accurate, useful and up-to-date information provided by Governments has been amplified during the COVID-19 pandemic.

A review of the 193 United Nations Member States national portals showed that by 25 March 2020, only 57 per cent (110 countries) had put in place some kind of information on COVID-19. The percentage of countries providing such information and guidance reached roughly 86 percent (167 countries) by 8 April 2020. Finally, on 13 May nearly 97.5 percent (188 countries) had information about COVID-19 in their national portals.

Figure 1 Percentage of Government portals with Covid-19 information and world total confirmed Covid-19 cases



Source: UN DESA, COVID-19 & Digital Government Compendium (2020), as at 11 May 2020. Available at https://bit.ly/EGOV_COVID19_APPS; World Health Organization

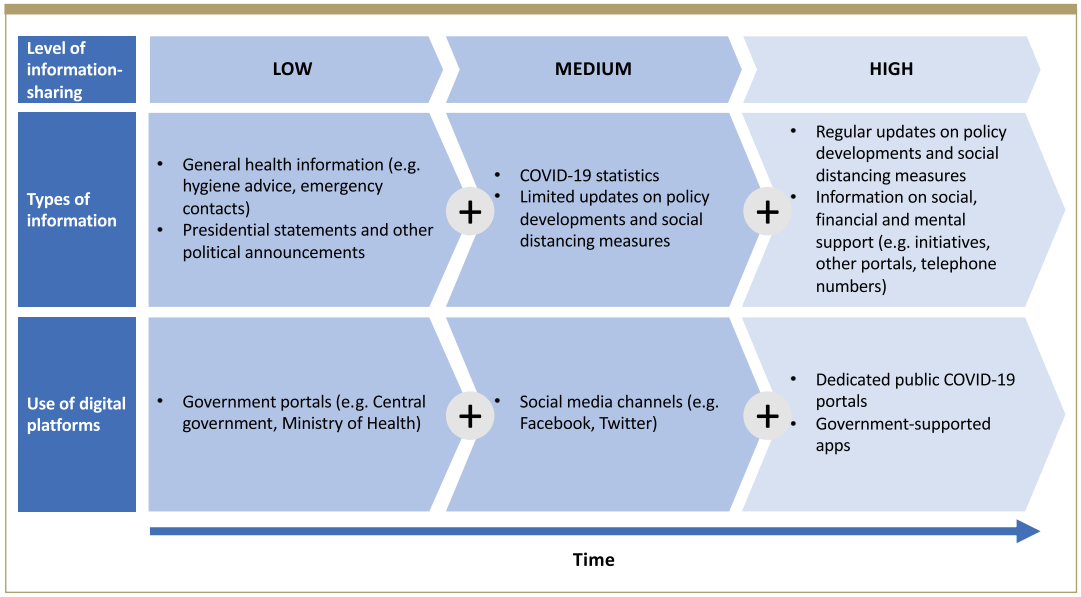
As the COVID-19 pandemic progressed, Governments increased their level of information-sharing (see Figure 2). According to portal research data, in March 2020, countries focused on providing basic information related to general health precautions and emergency numbers accompanied by public announcements on national portals (low level). As the crisis intensified, Governments began extending their reach and started using more social media channels to report on COVID-19 statistics (e.g. total number of cases in a country, total fatalities, as well as reporting cases by jurisdictions) and provided some limited national policy updates (medium level).

At a later stage in the crisis, more Governments started providing regular updates on policy developments and information on where people can receive social, financial or mental health support (high level). Some Governments started using dedicated COVID-19 portals to centralize the information. However, other Governments decided to continue using their national government portals to share extensive information on platforms that people are already familiar with. During the COVID-19 pandemic, policy makers were mobilized to engage in designing new services and apps as part of the crisis response. Some of these new services and apps went beyond information-sharing and included delivering food and other essential items to those most in need, thus optimizing the entire supply chain via digital government services.

The analysis of government portals during COVID-19 demonstrated that policy makers utilized multiple digital communication channels and increased information-sharing by providing up-to-date public data. It is in the hands of Governments to decide which channels are best suited to reach a wide audience and to provide accurate and timely information on the chosen platforms. During a

national crisis, reliable and transparent information enables Governments to act decisively, support people in making informed decisions about their daily routines, and give them a sense of support, which builds public trust.

Figure 2: Different levels of e-government information-sharing during COVID-19



Simultaneously, with increasing online information-sharing, there has also been a wave of fake news, disinformation and viral hoaxes. People with ill objectives or inadequate knowledge have contributed to the spread of incorrect data and information, which has created further panic in society. Thousands of COVID-19 scam and malware sites have emerged on a daily basis, such as the sale of counterfeit surgical masks or fake self-testing kits. The World Health Organization (WHO) has categorized this as the secondary issue of an "infodemic": "an overabundance of information — some accurate and some not — that makes it hard for people to find trustworthy sources and reliable guidance when they need it."[2] In response, some Governments have launched units or campaigns to coordinate the fight against COVID-19 online misinformation.

8.2 Regional cooperation

During the COVID-19 crisis, some new initiatives for regional digital cooperation in the areas of digital connectivity, data governance, e-learning, technological resilience and digitalization of public services delivery have surfaced. These regional initiatives aim to support Member States in their e-government response to the crisis. Regional organizations need to further explore how technology can be used to provide Governments and their people with the necessary tools to overcome medical and socio-economic challenges associated with the COVID-19 pandemic.

In Africa, the United Nations Economic Commission for Africa (ECA) and the Global Partnership for Sustainable Development Data (GPSDD) have established an initiative to strengthen Africa's data ecosystem to tackle the COVID-19 pandemic[3]. Low and lower-middle-income countries on the continent suffer from a lack of technology deployment, which slows down the ability of Governments to reach out to their citizens and effectively provide critical resources, including food supplies and healthcare services, to people during the crisis. This initiative, in partnership with the United Nations Statistics Division, the Sustainable Development Solutions Network, and the World Bank is focused on supporting African Governments in their response to COVID-19. The key areas of work include access to relevant data, analytics and visualization, training and capacity development, technology and connectivity, and financial resources.

The United Nations Economic and Social Commission for Western Africa (ESCWA) established a regional social solidarity fund to mitigate the impact of the crisis on vulnerable countries in the region[4]. The fund addresses a broad range of issues, including the role of technology for sustainable development in the region. The Arab League Educational, Cultural and Scientific Organization (ALECSO) has established an initiative to encourage open learning and e-learning to counteract the negative repercussions of the interruption of education in the region[5]. The initiative targets school children and aims to ensure continuity in learning during the pandemic, which has forced schools to close temporarily. ALESCO uses the latest technologies in the educational sector to provide open learning resources on its website and to offer technical support to teachers and students.

The United Nations Economic Commission for Latin American and the Caribbean (ECLAC) and the Development Bank of Latin America (CAF) have worked collaboratively with Governments and private sector leaders to improve the digital capacities of the region and help governments respond better to the crisis[6]. Their collaboration has aimed to provide technical and operational advice, while also recommending policy actions to be implemented in the short- to medium-term, such as public-private partnerships to widen access to the internet in remote areas or use of mobile apps and digital content to ensure people have access to timely and reliable information. The Inter-American Development Bank (IADB)[7] has established MovingOnline, a digital platform to support professors and students of the region in their transition from classrooms to virtual learning. As COVID-19 has forced many educators to use virtual teaching systems without previous training, this platform offers free multilingual tutorials, presentation templates and forums where experts and education workers can share experiences.

In the Americas, the Organization of American States (OAS) has developed a Virtual Platform of Emergency and Security Systems (EMS) that aims to help regions with their operation of emergency and security systems.[8] The virtual network represents a shared platform where authorities and experts from the region can exchange, share and consult information, materials and tools, and access a series of resources to deal with the situation in real time and free of charge. The OAS has also organized a panel discussion with EMS professionals and experts to discuss digital tools and government measures to protect EMS personnel during the crisis.

In Asia and the Pacific, the United Nations Economic and Social Commission of Asia and the Pacific (ESCAP) has continued working on digital technology and connectivity to increase the societal and economic resilience of its Member States.[9] For ESCAP, being prepared for the next crisis means in particular scaling up e-resilience and inclusive broadband. The Asian Development Bank (ADB) has been working on using technology for financial transparency during COVID-19. Its online COVID-19 Policy Database[10] is updated regularly and gives insights into the financial investments of every member country during the crisis. In this way, the platform provides transparency about the financial situation in each member country and the overall regional economic situation.

In Europe, European Union (EU) policy makers recognized the importance of contact tracing apps to fight the pandemic. However, they also realized that as a result of the internal market of the EU, countries need to work closely together to flatten the COVID-19 curve. For this reason, an international group of scientists, academics, technology experts and companies has been working on the Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT) project, a standardized smartphone data processing tool that can result in coordinated contact tracing across Europe and beyond. The PEPP-PT aims to increase the effectiveness of European contact tracing apps and minimize the risk of intrusive location-tracking applications gaining momentum during the crisis.[11] In addition, to ensure personal data protection when using contact tracing technology, on 17 April 2020, the European Commission issued guidance on "Apps supporting the fight against COVID 19 pandemic".[12] Following the European Commission's guidance, the European Data Protection Board (EDPD) also

published guidelines on the use of location data and contact tracing tools in the context of the COVID-19 outbreak.[13] Together with the PEPP-PT project, the EU's extensive COVID-19 data privacy guidance sets an example of how a region can coordinate part of its digital response to address the crisis, while ensuring the protection of people's data.

The above initiatives highlight that COVID-19 is not only be regarded as a series of national health crises, but also as a regional and global economic and social crisis that calls for a well-coordinated response. Countries need to further cooperate on e-government issues to ensure that COVID-19 can be overcome as quickly as possible, with the lowest number of fatalities and the least possible economic and social consequences. Regional organizations provide useful platforms to thematize the use of technology and the role of digitization for societies in relation to COVID-19. E-government efforts should be further strengthened and extended to also include stronger inter-regional cooperation to collectively tackle global socio-economic challenges including the lack of digital connectivity and the absence of digital skills.

8.3 Local e-government response

Local governments were at the forefront of the fight against the COVID-19 outbreak. As discussed in Chapter 4[14] 4.2.2 Current Status of Local Online Services: A Pilot Study, the 2020 Local Online Service Index (LOSI) average is 0.43, implying that most city portals are still offering basic features such as information provision and the e-service provision criterion scored the lowest among the 2020 LOSI criteria (see Chapter 4 for further details). While this may have represented a challenge for cities, there were some promising online services in the fight against COVID-19 introduced in a short time by local government officials, which should be highly commended.

During the pandemic, city portals provided information directing people to COVID-19 related services offered by central Governments. Sharing the public COVID-19 data was a key component of the urban emergency response. Dashboards were used at municipal and state levels to provide transparent and reliable information, increase awareness and connect people with appropriate resources (home care for the elderly, first aid provision, etc.). Vancouver has introduced an online dashboard to enable citizens to track the city's emergency response and efforts to curb the spread of COVID-19. A similar dashboard was developed by the New South Wales State Government in Australia to provide information on the number of cases and offer community resources at a postcode level.

With cities in lockdown, new needs have arisen. Automated chatbots, for example, have served an important role in providing information to citizens. Singapore has launched a chatbot to keep employers updated on developments regarding the COVID-19 virus. The region of Järvar Vald in Estonia developed a community engagement app that allowed local governments to share timely and reliable information and guidelines to prevent the spread of Coronavirus. The app included a social interaction component that allowed people to provide feedback to local government officials, to post social events and to share pictures or videos. In Sofia, the capital of Bulgaria, the municipality launched an app through which citizens can report breaches of the COVID-19 social distancing orders to support the work of police officers. In the Portuguese city of Guimarães, the municipality deployed an electronic platform to set up and manage volunteers who provide support for basic social care needs, particularly to those in the more vulnerable groups of the population.

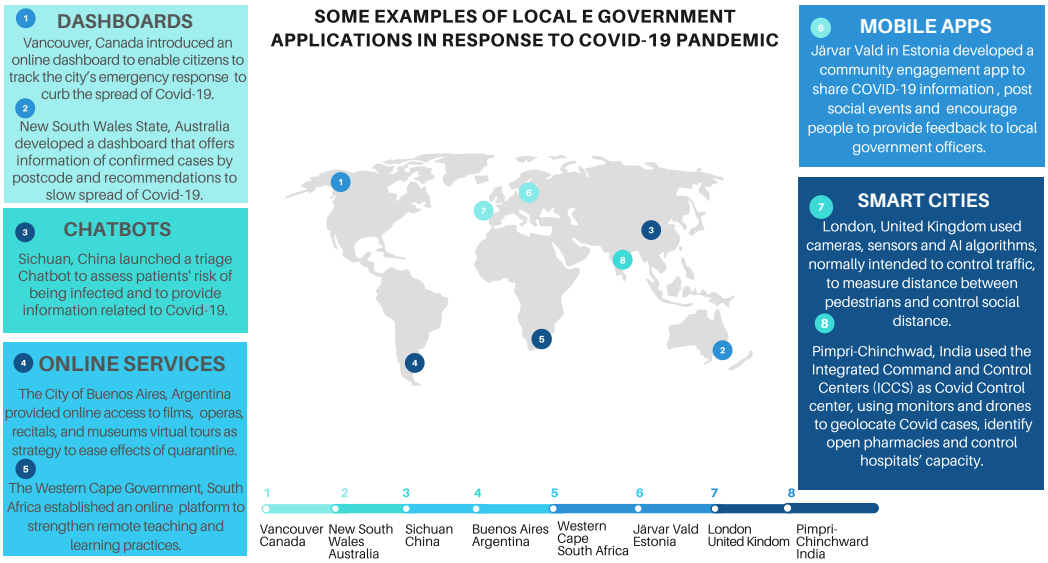
Cities have put more of their everyday services online when residents have been urged to self-isolate and many government employees worked remotely. In an effort to reduce the spread of germs through parking meters, the city of New York encouraged all residents and visitors to pay for parking using an app. In many cities, such as Agra in India, e-Doctor tele-video consultation facilities have

been launched as an alternative to reduce office-visits. Following an online consultation via mobile phone, patients can also download their prescriptions online.

Cities also took advantage of their smart city infrastructure to rapidly respond to the pandemic by utilizing more advanced technologies. Public officials relied on real-time movement, traffic or security information to make evidence-based decisions and early crisis predictions and adjust strategies accordingly. London[15] used cameras, sensors and AI algorithms, normally intended to control traffic, to measure distances between pedestrians and to monitor social distancing rules. The city also used mobility data to predict changes to localized security needs and future behavioural changes after the lockdown. In a similar fashion, Pimpri-Chinchwad city in India[16] turned its operational Integrated Command Control Centers, launched as part of its smart cities mission in 2015, as COVID-19 control centers. The city used real-time dashboards, video monitors, and drones for aerial surveillance to geolocate COVID-19 cases, identify open pharmacies and monitor hospitals' capacity.

In Hangzhou, China, the government launched a city Health QR Code service through the government platform based on the health data declared by residents or returned workers. The code could be applied by logging in through multiple public mobile platforms. Governments verify the personal declaration information with health, civil aviation, railway and other related data, and issue e-certificates with color codes to evaluate a person's personal health. People with green codes could walk freely outside, for example, going to the supermarket. People with red and yellow codes needed to be isolated at home, and community managers could provide assistance for their daily needs.

Figure 3: Examples of local e-government applications in response to COVID-19



Source: UN DESA. This graph represents a sample of e-government initiatives at the local level. Additional initiatives from United Nations Member States can be found in the UN DESA, COVID-19 & Digital Government Compendium (2020), Available at https://bit.ly/EGOV_COVID19_APPS.

Members of the UNESCO Creative Cities Network mobilized themselves to further reinforce solidarity and collaboration between cities during the pandemic. They aim to leverage the power of culture and creativity to cope with the evolving situation, and to strengthen cooperation among cities and reinforce ties between people and communities. Mexico City, Yamagata, Slemani, Rome and Chengdu have introduced culture initiatives (e.g., films, plays, operas, recitals, museums virtual tours) that can inspire and spread a message of hope during the pandemic. Buenos Aires launched several

initiatives to fight COVID-19. One of those relates to easing the quarantine effect on people by offering freely accessible cultural events online.

These local responses to the pandemic have revealed that in the midst of government-mandated social distancing measures, the economic, social, and civic structures of communities significantly influence the ability of cities and local governments to cope with the immediate crisis by deploying digital tools. Ultimately, firm structures of communities may be a strong predictor of resilience and recovery of whole countries in the near future and digital technologies can play an important role in bringing communities together.

8.4 Engaging with people and vulnerable groups

Involving civil society organizations, businesses, social entrepreneurs and the general public in managing the COVID-19 pandemic and its aftermath can prove highly effective for policy- and decision-makers. Government-led online engagement initiatives can help people to cope with the crisis as well as improve government operations. In a crisis situation, it becomes more important than ever to reach out to vulnerable groups in society, respond to their needs and ensure social stability. Engaging with civil society allows Governments to tackle socio-economic challenges in a more productive way that leaves no one behind.

Government-organized hackathons are one way of engaging people in finding innovative solutions to the economic, social and technological challenges caused by COVID-19. As the pandemic progressed, these types of virtual events quickly gained in popularity around the world. Public officials, together with software developers, civil society and social entrepreneurs, collectively searched for short-term solutions in order to overcome challenges such as the lack of medicines and protective medical equipment, the shortage of health personnel, and the deteriorating mental health of people as a result of social isolation.

In Burkina Faso, the Government, together with the Virtual University of Burkina Faso and the National Technology Agency, organized a hackathon to help find digital solutions to the emerging risks that COVID-19 poses to the country and its people.[17] The aim was to develop new applications to help with information sharing, surveillance and the detection of fake news during the pandemic. The first health COVID-19 hackathon organized by the WHO was held in Burkina Faso and focused on finding creative local solutions for managing the pandemic and addressing critical gaps in the regional response of Sub-Saharan Africa.[18] In Colombia, the Ministry of Information Technologies and Communications and iNNpulsa have launched a public innovation challenge and digital platform for the entrepreneurial and business sector to develop short-term solutions to mitigate the impact of COVID-19.[19] With the increasing demand for health services, innovators are expected to come up with solutions to reduce traffic in health facilities, optimize health services and avoid a lack of medical supplies.

Many Governments have utilized social media platforms to connect with people. Some also have partnered with influencers to spread accurate information about the COVID-19 outbreak, and to counter harmful misinformation. There has been a particular focus on engaging with youth and children, who are very vulnerable to fake news and might suffer from the burden the COVID-19 crisis put on parents' social, economic, and mental well-being. For example, Norway's Prime Minister Erna Solberg held an online press conference with a Q&A session specifically for kids to help ease their fears. In France, the Government's startup incubator Beta.gouv.fr and the Ministry of National Education developed a civic reserve platform to help match and connect public and civil society organizations with volunteers. Organizations and citizens can register on the platform for a variety of tasks, such as assisting with the distribution of necessities, or providing childcare for healthcare workers.

UNICEF has also partnered with Governments to provide COVID-19 related information to more than 10 million young people using U-Report, UNICEF's mobile platform for youth participation.[20] Through a chatbot embedded in all social media platforms, U-Report provides COVID-19 related information by country, assesses needs based on real-time surveys and offers e-learning, and job skills training programs particularly designed for adolescents.

Furthermore, Governments have also explored new ways of using technology to engage with older persons, who, as a result of the stay-at-home orders, have been experiencing social isolation and loneliness. In Canada, for example, some provinces, in cooperation with the Canadian Mental Health Association, have developed virtual mental health support platforms and virtual counselling services to support the elderly and other people who are experiencing psychological stress as a result of the crisis.[21] During COVID-19, the existing trend of using multi-function e-participation platforms has been accelerated (see Chapter 5 for more details), since Governments have started experimenting with new forms of communication to reach out to and support diverse groups in society in a timely manner.

At the same time, helping the most vulnerable groups in society, including migrants, refugees and ethnic minorities has remained a challenge for Governments during COVID-19. Particularly migrant and refugee groups often have limited access to technologies and live in remote areas, and, therefore, have difficulties accessing information or support during the crisis.[22] During COVID-19, Qatar has installed computers in labor compounds to provide virtual consultations for migrant workers. Singapore has founded an e-campaign to raise money for its migrant workers community which has been seriously affected by COVID-19. While some countries have engaged in efforts to help these communities, international organizations have been the main drivers behind the use of technology to support them. For example, the World Food Program (WFP) in Bangladesh extended its "Building Blocks" technology to Rohingya refugees in the Cox's Bazar camp to prevent food shortages.[23] This technology allows refugees to use QR code cards that they can scan to collect assistance from international humanitarian organizations, which manage the rations that each refugee receives. In Vietnam, an IT-enabled social assistance program by the World Bank has been implemented to send allowances via mobile money to ethnic minorities in the Cao Bang Province.[24] National Governments need to think of new technology-based two-way communication channels[25] to ensure that low-income and marginalized communities receive the help they need during and after the COVID-19 pandemic. In this regard, many international organizations have emphasized for a long time that internet access is a basic need. Governments, companies, international and civil society organizations have to work together to progress towards universal internet access and bring as many people online as possible.

8.5 Data and the use of new technologies

In recent years more Governments have started integrating new technologies, such as artificial intelligence (AI) and blockchain technology in digital government strategies. Since Governments have been searching for ways to effectively contain the COVID-19 outbreak and relieve the stress on public services, this trend has further intensified. Most innovative quick-to-market solutions have stemmed from the private sector. However, the crisis has exposed the need for increased government leadership in the development and adoption of new technologies such as AI and robotics to ensure an effective provision of public services.

AI-powered technology has proven to be beneficial for the provision of health care services when emergency lines outpaced capacity. In Indonesia, the Government's Task Force for Research and Technological Innovation has been working on models to use AI to strengthen diagnostics by doctors in detecting the Coronavirus.[26] During the outbreak, many people have turned to self-checks for

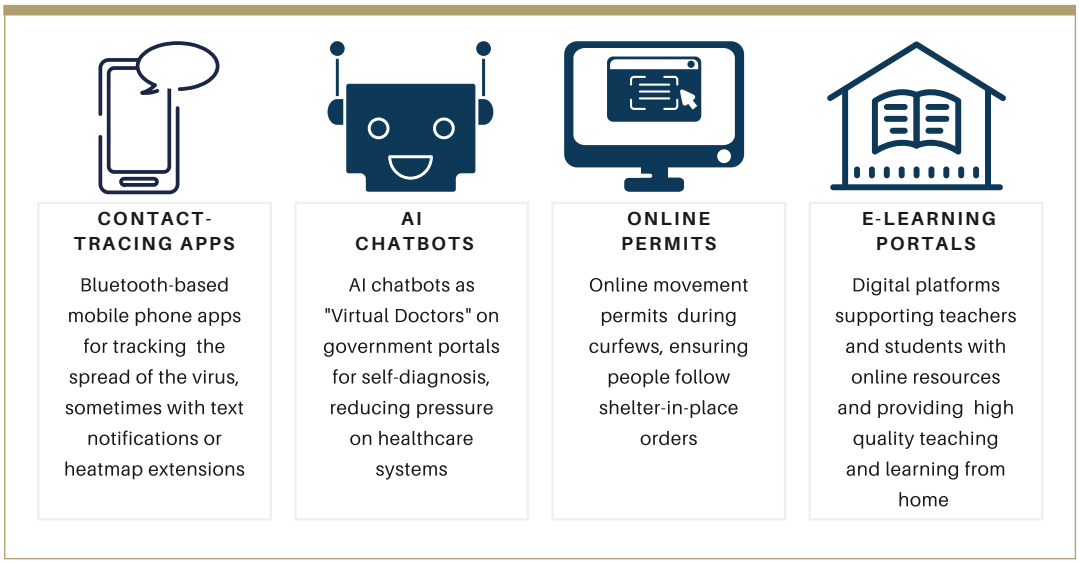
symptoms and accessed "virtual doctors" to get medical advice. For example, in Croatia, the "virtual doctor" is powered by artificial intelligence and has been developed by Croatian IT companies in cooperation with epidemiologists. This digital medical assistant is proving highly effective, since it can process tens of thousands of requests on a daily basis, while doctors can only handle some 50 calls a day.

Chatbots have offered solutions in overcoming language barriers, accessing information and communicating with health practitioners. 3D printing technologies have been adopted to produce replacement valves for reanimation devices, and protective medical face shields to address the shortage. During COVID-19, Italy was one of the first countries to expand its production of valves through 3D printing technology developed by Italian engineers.[27] The Austrian Government has been cooperating with the University of Technology Graz to produce 300 more protective masks and hospital gear items per day, which are urgently needed in hospitals and general practices.[28]

Robots have been effective in providing security and sanitation, thus, reducing staff exposure to health risks. Patrol robots using facial recognition and thermal cameras are deployed at airports and public places to scan crowds and identify potentially infected people. Sterilization robots equipped with ultraviolet lights have been helpful to disinfect hospitals and contaminated areas. Other robots monitor vital parameters from medical devices or allow patients to communicate remotely with nurses. Governments are also using drones with similar technologies to monitor streets, deliver medical supplies or disinfect public spaces. In Oman, for example, the Royal Oman Police is using drones to instruct citizens and residents to stay at home and avoid stepping out unless it is absolutely necessary.[29]

The COVID-19 pandemic has emphasized the importance of technology, but also the pivotal role of an effective, inclusive and accountable government. Government efforts in deploying new technologies should be accompanied by improving data protection and digital inclusion policies as well as strengthening the policy and technical capabilities of public institutions. Government leadership, strong institutions, and effective public policies are crucial to tailor digital solutions to countries' needs as well as prioritize security, equity and the protection of people's rights. The crisis has brought to surface that a whole-of-government view in designing a data governance framework, supported by a national data strategy, data leadership and a data ecosystem is very useful to harvest public value from data (see Chapter 6 for more information).

Figure 4: Sample of popular e-government applications used during COVID-19



To learn more about the use of digital technologies during COVID-19, UN DESA has launched a call for e-government applications as part of the 2020 E-Government Survey. UN DESA received nearly 500 submissions from 91 countries that describe how Governments around the world use different digital applications to manage and overcome the various effects of the pandemic. Figure 4 provides a small sample of popular e-government applications submitted by the Member States.

8.6 Establishing multi-stakeholder partnerships

Governments often lack financial and human resource capabilities to quickly and efficiently develop digital tools and new technologies that can support people during a crisis situation. Therefore, building partnerships with private technology companies, social entrepreneurs, academia, NGOs or international organizations can represent an effective way for Governments to make use of existing technologies to meet the needs of people and soften the impact of the crisis on their lives.

During the COVID-19 outbreak, public authorities have started cooperating with a variety of stakeholders. For example, the United States' Government issued a call for action to key industry stakeholders and artificial intelligence experts to develop new text and data mining techniques that can help the scientific community answer high-priority questions related to COVID-19.[30] This platform can help speed up research and support with guidance on diagnosis, treatment and management of infected patients globally, including in developing countries that have more limited resources.

Partnerships between Governments, businesses and international organizations can also be crucial to maintain services for mission-critical communications and to ensure greater connectivity. The International Telecommunication Union (ITU) has launched a platform to assist national policy-makers, regulators and industry stakeholders to ensure that networks are resilient and telecommunication services are available to all in order to prevent further aggravation of digital divides during the COVID-19 crisis.[31] The WHO and the ITU, with support from UNICEF, are set to work with telecommunication companies to text people directly on their mobile phones with vital health messaging to help protect them from COVID-19.[32] These text messages will reach billions of people who are not able to connect to the internet for information. In some countries, telecommunication providers have committed to maintaining network capacity and services for critical government functions, particularly in hospitals and for emergency personnel. In the same way, the European Commission together with the Body of European Regulators of Electronic Communications (BEREC) has launched a special reporting mechanism to monitor Internet traffic in each Member State and to ensure reliable connectivity for all people during the pandemic.[33]

The COVID-19 crisis has strained the supply chain for medical supplies. Demand for medical equipment has exponentially increased, which has created shortages and often exposed medical personnel to greater risks. To address the problem, many private companies partnered with government agencies to develop health apps that help people, hospital staff and medical practitioners to monitor, analyze, and source critical medical equipment such as ventilators, face masks, gloves and protective gear in real time. For example, in Mauritius, the Ministry of Health and Wellness has partnered with the private sector to bring in video conferencing solutions to help hospital staff communicate medical supply needs and other crisis-related issues to the Government.

Digital platforms have been deployed to help with community-driven contact tracing of people who have tested positive to having the virus. Singapore was one of the first countries to implement contact tracing technology with its TraceTogether App during the current health crisis. Contact tracing apps use the bluetooth feature of mobile phones to anonymously save data of other users with whom one has crossed paths. If a person has encountered someone who becomes infected, that person receives a notification to inform them, which allows for immediate self-testing or self-isolating. Innovative apps

such as these have been developed by many different private companies and supported Government attempts to contain the number of infections. Tracing apps must have high standards of privacy and personal data protection as well as re-approval clauses on data use beyond the crisis. Effective and timely public-private partnerships are particularly critical during these times, since these applications only provide results with a large user-base. During the pandemic, Apple and Google announced that they will be launching a comprehensive solution that includes application programming interfaces (APIs) and operating system-level technology for data interoperability among mobile phones, to assist policy makers in enabling contact tracing.[34]

Multi-stakeholder partnerships for the implementation of new technologies have shown positive effects on the fight against the outbreak. However, prioritizing anonymization while aggregating personal information, the use of geolocation, as well as the access to medical records is important to protect personal data privacy. Protection and safety online is critical, particularly in the time of the COVID-19 pandemic, which has accelerated the sharing of public and private data across sectors and countries. Policy makers need to take into consideration the principle of minimization and limited collection, retention and sharing of personal data to prevent over-surveillance and violation of data privacy. This means focusing on collecting, retaining and sharing private data that is rationally linkable to the purpose of overcoming the global pandemic.

8.7 The way forward

The COVID-19 pandemic has forced Governments and societies to turn toward digital technologies to respond to the crisis in the short-term, recover from and resolve socio-economic repercussions in the mid-term, and reinvent existing policies and tools in the long-term (see Table 1). At the same time, with only ten years left to deliver on the promise of the 2030 Agenda for Sustainable Development, Governments need to work on strengthening the relationship between technology and sustainable development. Despite these challenging times, the COVID-19 pandemic can serve as a motivation to fulfill this promise, as outlined specifically below.

Governments should continue to adopt an open government approach and use digital communication channels to provide reliable public information to their people. E-participation platforms can represent useful tools to engage with vulnerable groups online and to establish digital initiatives to collectively brainstorm for policy ideas to critical social and economic challenges. Sharing personal information online also requires Governments to be careful about people's privacy and their sensitive data. Ultimately, strengthening open data and implementing better data protection and privacy laws can support the development of effective, accountable and transparent institutions, while protecting people's fundamental rights (SDG 16: Peace, Justice and Strong Institutions).

Using multi-stakeholder partnerships to share technologies, expertise and tools can support Governments in the recovery process that involves restarting the economy and rebuilding societies. Developing countries, in particular, cannot mitigate the crisis alone. Therefore, national, regional and local project-based collaborations with private sector companies, academia, civil society, international organizations and other stakeholders are necessary. Building such multi-stakeholder partnerships for technological progress can support Governments in operationalizing technology for the provision of critical public services and improve capacity-building measures in developing countries (SDG 17: Partnerships for the Goals).

The COVID-19 pandemic has also highlighted the central role of cities and local governments in responding to the needs of their residents with innovative digital platforms, tools, apps and smart technologies. Countries can only recover economically and socially from COVID-19 if cities and local governments have the necessary support structures to help their people. As emphasized in various

reports, around 65 percent of the total SDG targets will have to be delivered by local authorities and actors.[35] Therefore, it is time for Governments to encourage and support cities and local governments to achieve greater inclusivity, safety, resilience and sustainability through the use of technology (SDG 11: Sustainable Cities and Communities).

Table 1: Digital government policy response to COVID-19

Time horizon	Policy action	Digital government response
Short-term	React	• Use digital platforms (i.e., online portals, social media) for accurate and timely information-sharing • Lead two-way communication with people and foster e-participation (i.e. hackathons, brainstorming events) • Ensure protection of people's human rights including data privacy and take into consideration unintended consequences of technology
Mid-term	Recover & Resolve	• Form effective multi-stakeholder partnerships (i.e. private sector, academia, NGOs and international organizations) on regional, national and local levels • Provide technology education for digital literacy, specifically targeted at public officials, children, women/girls and MSMEs • Offer financial and technical support to local governments in the implementation of digital tools and technologies • Leverage lessons learned and policy ideas from the ongoing crisis
Long-term	Reinvent	• Invest in new technologies (i.e., AI, blockchain, robots, drones) and ICT infrastructure to increase the resilience of the health economy and public services delivery • Develop digital infrastructure and engagement tools for the most vulnerable groups in society, particularly for migrants, refugees and ethnic minorities • Revisit data protection and privacy legislation along with lessons learned

In the long-term, Governments need to accelerate the implementation of new digital technologies such as AI, blockchain, and drones. Investments in these technologies can tremendously support the future resilience of the economy by improving the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks (SDG 3: Good Health and Well-Being). However, at the same time, Governments need to consider and mitigate the privacy risks and the risks of over-surveillance associated with using new technologies. As the Survey has emphasized, achieving sustainable e-government transformation also means following a holistic approach of

(i) analysing the current situation,
(ii) articulating a shared vision,
(iii) formulating a common strategy, and
(iv) monitoring and evaluating its impact (see Chapter 7 for more details).

Government capacity building measures to increase the use of technology for the provision of critical public services need to, first and foremost, be driven by public value.

The use of technology for sustainable development requires Governments to reduce inequalities by investing in innovative technologies and digital skills for all groups in society to ensure equal opportunities in the digital economy (SDG 10: Reduced Inequalities), particularly empowering girls and women through digital literacy (SDG 5: Gender Equality). The pandemic has shown the importance of digital connectivity and literacy to thrive in a fast-changing environment, but has also exposed the breadth of the digital divides that are leaving the most vulnerable groups behind.

There is urgency to expand affordable internet access and to invest in STEM education to improve digital equity efforts. Nonetheless, this is not possible without investing in widespread and affordable ICT infrastructure (SDG 9: Industry, Innovation and Infrastructure) as well as providing technology education to public officials, children and MSMEs to ensure everyone can prosper in the digital age (SDG 4: Quality Education). Ultimately, making technology accessible to everyone will help people reap the benefits of the Fourth Industrial Revolution and support the livelihoods of families and children (SDG 1: No Poverty; SDG 2: Zero Hunger).

The crisis has illustrated that it is impossible for societies to ignore technological advancements as they are continuing to change business models and people's everyday lives. Policy makers should seize the COVID-19 crisis as an opportunity to establish tailor-made digital government tools, strategies and collaborations for the future. Embracing e-government and harvesting the digital opportunities amplified by the COVID-19 pandemic holds the potential to support the long-term sustainable development of all United Nations Member States.

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Annexes

Survey Methodology

A.1. E-Government Development Index: An Overview

Mathematically, the E-Government Development Index (EGDI) is the weighted average of normalized scores on the three most important dimensions of egovernment, namely:

(i) the scope and quality of online services quantified as the Online Service Index (OSI);
(ii) the status of the development of telecommunication infrastructure or the Telecommunication Infrastructure Index (TII); and
(iii) the inherent human capital or the Human Capital Index (HCI). Each of these indices is a composite measure that can be extracted and analyzed independently.

$$EGDI = \frac{1}{3}(OSI_{normalized} + TII_{normalized} + HCI_{normalized})$$

Prior to the normalization of the three component indicators, the Z-score standardization procedure is implemented for each component indicator to ensure that the overall EGDI is equally decided by the three component indices, that is, each component index presents comparable variance subsequent to the Z-score standardization. In the absence of the Z-score standardization treatment, the EGDI would mainly depend on the component index with the greatest dispersion. After the Z-score standardization, the arithmetic average sum becomes a good statistical indicator, where "equal weights" truly means "equal importance."

For standard Z-score calculation of each component indicator:

$$Xnew = \frac{x - \mu}{\sigma}$$

Where:

x is a raw score to be standardized;

μ is the mean of the population;

σ is the standard deviation of the population.

The composite value of each component index is then normalized to fall between the range of 0 to 1 and the overall EGDI is derived by taking the arithmetic average of the three component indices.

The EGDI is used as a benchmark to determine a numerical ranking of e-government development of United Nations Member States. While

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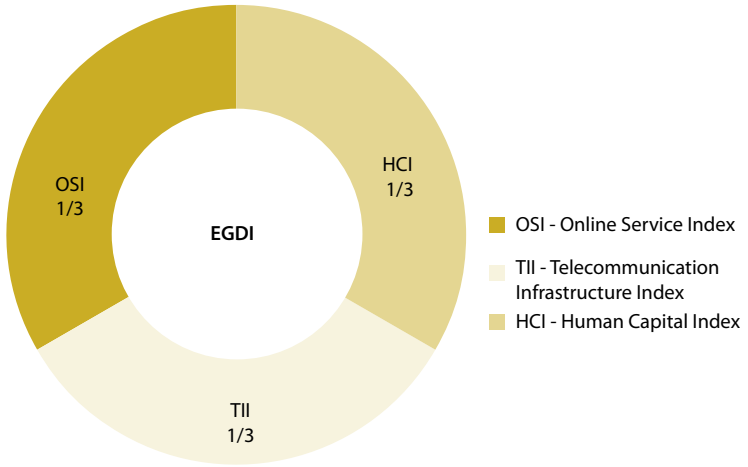
the methodological framework for EGDI has remained consistent across the editions of the *United Nations E-Government Survey*, each edition of the *Survey* has been adjusted to reflect emerging trends of e-government strategies, evolving knowledge of best practices in e-government, changes in technology and other factors. In addition, data collection practices have been periodically refined.

The imputation of missing data is an important step in the construction of a good quality composite

Figure A.1. The three components of the E-Government Development Index (EGDI)



indicator. The problem has been studied since 2001; in the EGDI methodology the cold deck imputation or use of older values for the missing data has always been the first choice of action. Nevertheless, there are cases where no data is available at all. In these cases, a combination of the unconditional mean imputation and the hot deck imputation was used. This combination is based on the "donor imputation" methodology, which replaces missing values in a record with the corresponding values from a complete and valid record.

A.2. Telecommunication Infrastructure Index (TII)

The Telecommunication Infrastructure Index is an arithmetic average composite of four indicators:

(i) estimated internet users per 100 inhabitants;
(ii) number of mobile subscribers per 100 inhabitants;
(iii) active mobile-broadband subscription; and
(iv) number of fixed broadband subscriptions per 100 inhabitants.

The International Telecommunication Union is the primary source of data in each case. (See Figure A.2) Data for each component was extracted from the ITU source on 23 December 2019.

The definitions of the four components of TII[1] are:

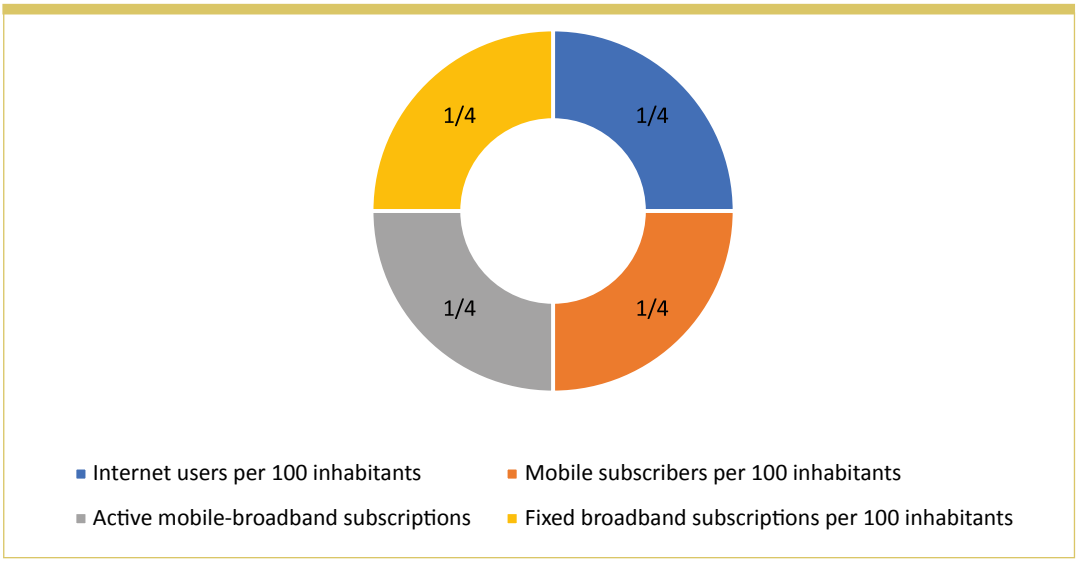
(i) "Internet users per 100 inhabitants" refers to individuals who used the Internet from any location in the last three months[2].
(ii) "Mobile subscribers per 100 inhabitants" is the number of subscriptions to mobile service in the last three months. A mobile/cellular telephone refers to a portable telephone subscribed to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems and technologies such as IMT-2000 (3G) and IMT-Advanced. Users of both post-paid subscriptions and prepaid accounts are included.

(iii) "Active mobile-broadband subscriptions" refers to the sum of data and voice mobile-broadband subscriptions and data-only mobile-broadband subscriptions to the public Internet. It covers subscriptions being used to access the Internet at broadband speeds, not subscriptions with potential access, even though the latter may have broadband-enabled handsets. Subscriptions must include a recurring subscription fee to access the Internet or pass a usage requirement – users must have accessed the Internet in the previous three months. It includes subscriptions to mobile-broadband networks that provide download speeds of at least 256 kbit/s (e.g. WCDMA, HSPA, CDMA2000 1x EV-DO, WiMAX IEEE 802.16e and LTE), and excludes subscriptions that only have access to GPRS, EDGE and CDMA 1xRTT.[3]

(iv) "Fixed broadband subscriptions per 100 inhabitants" refers to fixed subscriptions to high-speed access to the public Internet or a TCP/IP connection, at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fiber-to-home/building, other fixed/ wired-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications, including the Internet via mobile-cellular networks. It should include fixed WiMAX and any other fixed wireless technologies. It includes both residential subscriptions and subscriptions for organizations.

Conceptually, the TII has remained largely unchanged since 2002. Two components, i.e. internet users and mobile-cellular phone subscriptions have been used in the past *Surveys* since 2002. However, given the availability of suitable data, several replacements were introduced during the years, such as the replacement of "online population" with "fixed-broadband subscription" and the removal of "number of television sets" in 2008; the replacement of "personal computer users" with "fixed Internet subscriptions" in 2012; the replacement of "fixed Internet subscriptions" with "wireless broadband subscriptions" in 2014 (See Table A.1). In 2018, the "wireless broadband subscriptions" indicator was replaced by "active mobile-broadband subscriptions". Due to the advancements in communication technologies; fixed-telephone subscription has been decreasing for many countries in which mobile communications and internet-based alternatives are preferred as medium of communication. This has resulted in "fixed-telephone subscriptions" not being an accurate representation of telecommunication infrastructure capacity. Therefore, in 2020, the component of "fixed-telephone subscriptions" has been removed from the index calculation.

Figure A.2. Telecommunication Infrastructure Index (TII) and its components



The improvement of data quality and coverage has led to the reduction of data gaps that appeared in prior *Surveys*. However, in cases where gaps still occur, an effort is made to obtain data first from the Word Bank data base, and then, if these efforts prove unsuccessful, the most recent ITU data is used. Due to insufficient data at ITU's end, it has been not possible to include other internet indicators into TII. Another measure introduced in 2020 is that a cutoff limit of 120 has been applied to TII components described above.

Each of these indicators was standardized through the Z-score procedure to derive the Zscore for each component indicator. The telecommunication infrastructure composite value for country "x" is the simple arithmetic mean of the four standardized indicators derived as follows:

Telecommunication infrastructure composite value **=**

Average (Internet user Z-score

+ Mobile/Cellular telephone subscription Z-score

+ Active mobile broadband subscription Z-score

+ Fixed-broadband subscription Z-score)

Finally, the TII composite value is normalized by taking its value for a given country, subtracting the lowest composite value in the *Survey* and dividing by the range of composite values for all countries.

Table A.1. Telecommunication infrastructure index (TII) and changes of its components (2003-2018)

TII (2001,2003,2004,2005)	TII (2008)	TII (2010)	TII (2012)	TII (2014)	TII (2016)	TII (2018)	TII (2020)
Internet users	Internet users	Internet users	Internet users	Internet users	Internet users	Internet users	Internet users
Online population	Fixed-broadband subscriptions	Fixed-broadband subscriptions	Fixed-broadband subscriptions	Fixed-broadband subscriptions	Fixed-broadband subscriptions	Fixed-broadband subscriptions	Fixed-broadband subscriptions
Personal computer (PC) users	Personal computer (PC) users	Personal computer (PC) users	Fixed Internet subscriptions	Wireless broadband subscriptions	Wireless broadband subscriptions	Active mobile-broadband subscriptions	Active mobile-broadband subscriptions
Mobile-cellular subscriptions	Mobile-cellular subscriptions	Mobile-cellular subscriptions	Mobile-cellular subscriptions	Mobile-cellular subscriptions	Mobile-cellular subscriptions	Mobile-cellular subscriptions	Mobile-cellular subscriptions
Fixed-telephone subscriptions	Fixed-telephone subscriptions	Fixed-telephone subscriptions	Fixed-telephone subscriptions	Fixed-telephone subscriptions	Fixed-telephone subscriptions	Fixed-telephone subscriptions	-
Television sets	-	-	-	-	-	-	-

For example, if country "x" has the composite value of 1.3813, and the lowest composite value for all countries is -1.1358 and the highest is 2.3640, then the normalized value of TII for country "x" would be:

$$\text{TII (Country "x")} = \frac{[1.3813 - (-1.1358)]}{[2.3640 - (-1.1358)]} = 0.7192$$

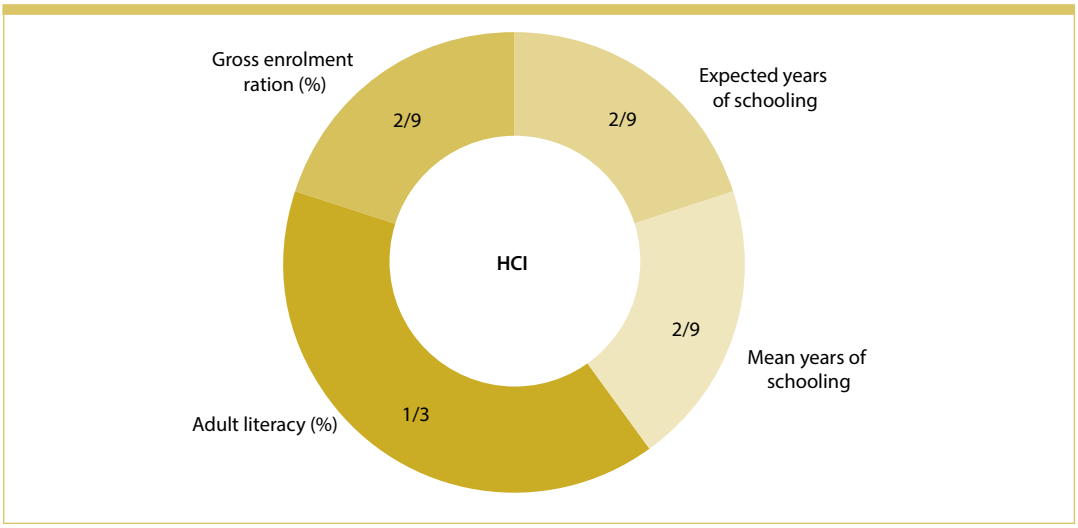
A.3. Human Capital Index (HCI)

The Human Capital Index (HCI) consists of four components:

(i) adult literacy rate;
(ii) the combined primary, secondary and tertiary gross enrolment ratio;
(iii) expected years of schooling; and
(iv) average years of schooling.

(See Figure A.3) Data for HCI components was extracted from the UNESCO-UIS source on 23 December 2019.

Figure A.3. Telecommunication Infrastructure Index (TII) and its components



The four indicators of HCI are defined as follows:

1. "Adult literacy" is measured as the percentage of people aged 15 years and above who can, with understanding, both read and write a short simple statement on their everyday life.
2. "Gross enrolment ratio" is the total number of students enrolled at the primary, secondary and tertiary level, regardless of age, as a percentage of the school-age population.
3. Expected years of schooling is the total number of years of schooling that a child of a certain age can expect to receive in the future, assuming that the probability of his or her being in school at any specific age is equal to the current enrolment ratio age.
4. Mean years of schooling (MYS) provides the average number of years of education completed by a country's adult population (25 years and older), excluding the years spent repeating grades.

The first two components, (i.e., the adult literacy rate and the combined primary, secondary and tertiary gross enrolment ratio) have been used in allfor the past *Surveys* editionssince 2002. Recognizing that education is the fundamental pillar in supporting human capital, the *2014 Survey* introduced two new components to the human capital index (HCI), namely

(i) expected years of schooling; and
(ii) mean years of schooling.

The preliminary statistical study commissioned by DESA/DPIDG validated the use of the new HCI, accentuating that the two new components has strengthened the HCI without introducing any

error[4]. Also a cutoff limit of 100 has been applied to Gross enrolment ratio component. Digital literacy indicators could not be used for this survey due to not having enough data on digital literacy.

Table A.2. Human Capital Index and changes of its components (2003-2014)

Components of HCI in past surveys 2002, 2003, 2004, 2008, 2010, 2012)	Components of HCI in 2014 survey
Adult literacy	Adult literacy
Gross enrolment ratio	Gross enrolment ratio
-	Expected years of schooling
-	Mean years of schooling

The HCI is a weighted average composite of the four indicators. In the same manner the TII is computed, each of the four component indicators is first standardized through the Z-score procedure to derive the Z-score value for each component indicator. The human capital composite value for country "x" is the weighted arithmetic mean with one-third weight assigned to adult literacy rate and two-ninth weight assigned to the gross enrolment ratio, estimated years of schooling and mean years of schooling derived this way:

Human capital composite value =

1/3 x Adult literacy rate Z-score +

2/9 x Gross enrolment ratio Z-score +

2/9 x Estimated years of schooling Z-score +

2/9 x Mean years of schooling Z-score

The human capital composite value is then normalized by taking its composite value for a given country, subtracting the lowest composite value in the *Survey* and dividing by the range of composite values for all countries. For example, if country "x" has the composite value at 0.8438, and the lowest composite value for all countries is –3.2354 and the highest equal to 1.2752, then the normalized value of the Human Capital Index for country "x" would be:

$$\text{Human Capital Index (Country "x")} = \frac{[0.8438 - (-3.2354)]}{[1.2752 - (-3.2354)]} = 0.9044$$

A.4. Online Service Index (OSI)

The 2020 Online Services Questionnaire (OSQ) consists of a list of 148 questions. Each question calls for a binary response. Every positive answer generates a "more in-depth question" inside and across the patterns. The outcome is an enhanced quantitative survey with a wider range of point distributions reflecting the differences in the levels of e-government development among Member States.

The total number of points scored by each country is normalized to a range of 0 to 1. The online index value for a given country is equal to the actual total score less the lowest total score divided by the range of total score values for all countries. For example, if country "x" has a score of 114, and

the lowest score of any country is 0 and the highest equal to 153, then the online services value for country "x" would be:

$$Online\ Service\ Index\ (Country\ "x") = \frac{(114-0)}{(153-0)} = 0.7451$$

To arrive at a set of Online Service Index values for 2020, along with 14 UN staff members and 18 interns who has worked for the Survey, a total of 212 online United Nations Volunteer (UNV) researchers from 98 countries covering 69 languages, assessed each country's national website in the native language, including the national portal, e-services portal and e-participation portal, as well as the websites of the related ministries of education, labor, social services, health, finance and environment, as applicable. The UNVs included qualified graduate students and volunteers from universities in the field of public administration.

To ensure consistency of assessments, all the researchers were provided with a rigorous training by e-government and online service delivery experts with years of experience in conducting the assessments and were guided by Data Team Coordinators who provided support and guidance throughout the assessment period. Researchers were instructed and trained to assume the mind-set of an average citizen user in assessing sites. Thus, responses were generally based on whether the relevant features could be found and accessed easily, not whether they in fact exist but are hidden somewhere in the site(s). The key point is that the average user needs to find information and features quickly and intuitively for a site to be "usable" with content readily discoverable by the intended beneficiaries.

The data collection and *Survey* research ran from June 2019 until the end of September 2019. Each country was assessed by at least two researchers who conducted the assessment in the country's national language. After the initial assessment, the evaluations by the two researchers on each country were compared and questions regarding discrepancies were reviewed together and resolved by the researchers. The third phase, from October to November, was the final review by the Data Team Reviewers who analyzed all the answers and, where needed, carried out further review and verification processes using multiple methods and sources. The scores were then sent for approval to a Senior Reviewer. Through this multilevel approach, all surveyed sites were thoroughly assessed by at least three people, one of whom has years of experience in assessing public sector online services, and reviewed by one of the Data Team Coordinators.

Once the evaluation phase was completed, the statistics team produced the first draft of the OSI ranking. Data was extracted from the platform and the raw OSI scores were created. Rankings were compared with previous OSI scores, and discrepancies were thoroughly reviewed.

A.5. List of Features Assessed

Multiple linkages to the Sustainable Development Goals (SDG) have been included in both the OSQ and the Member State Questionnaire (MSQ). The MSQ is further discussed in more detail in Section A.7 of this Chapter. As has been done in analytical chapters of past editions of the *Survey*, selected themes or proxy themes related to e-government and sustainable development have been also analyzed, for example, open government data, e-participation, mobile-government and whole-of-government approach. Reviews of the OSQ were undertaken in 2016, 2018 and 2020 to include questions related to key services across the SDGs domains, including health, education, social protection, gender equality, and decent work and employment, as well as through the SDG principles highlighted in GoalSDG 16, including effectiveness, inclusion, openness, trustworthiness, and accountability. To be consistent with these principles, and taking into account feedback from various external evaluations, the 2020 OSQ introduced questions related to justice systems' online services.

Below is a list of areas assessed in the 2020 edition of the *United Nations E-Government Survey*. It should be noted that this list is dynamic and is updated for each edition of the *Survey*. The language for the areas starts with:

- "information about" something such as laws, policies, legislation or expenditures
- "existence of" a feature such as social networking tools
- "ability to" do something on the website i.e. run a transaction

Information about accessible public transportation
Information about affordable public housing
Information about citizen's rights to access government information
Information about citizenship application
Information about diseases affecting older persons
Information about early childhood development, care and pre-primary education
Information about education policy or budget
Information about electricity or power outage
Information about employment/labor policy or budget
Information about environment-related policy or budget
Information about equal access to education for children in vulnerable situations
Information about equal access to education for persons with disabilities
Information about gender equality (policy/legislation)
Information about government scholarship programs or education funding
Information about government-wide Chief Information Officer (CIO) or equivalent online
Information about health policy or budget
Information about health-emergency preparedness
Information about housing support for older persons
Information about justice policy or budget
Information about labor laws and regulation
Information about laws and regulations against discrimination
Information about local/regional government agencies
Information about national budget or budget policy
Information about organizational structure of the government
Information about payments for government services through different channels
Information about personal data protection
Information about pollution and precautionary measures
Information about primary government expenditures
Information about privacy statement
Information about programs/initiatives benefiting the poor or vulnerable groups
Information about public sector workforce distribution by sex
Information about reduction, recycling and reuse of waste
Information about reproductive healthcare services
Information about results of any government procurement/bidding process
Information about road safety
Information about road traffic accidents statistics
Information about schools with accessible facilities
Information about services in partnership with 3rd parties

Information about social protection policy or budget
Information about technical and vocational skills training for youth
Information about upcoming e-participation activities
Information about upcoming procurements
Information about using open data sets
Information about web statistics on usage of national portal(s)
Information about women's right to access to sexual/reproductive healthcare, information and education (policy/legislation)
Existence of a data dictionary or metadata repository in the portal
Existence of a mobile app to provide e-government services
Existence of a national e-government/digital government strategy online
Existence of a national portal, an open data portal
Existence of a sitemap
Existence of an e-participation policy/mission statement
Existence of an e-procurement platform
Existence of an open government data policy online
Existence of an outcome of an e-consultation resulted in new policy decisions
Existence of cross-browser compatibility of website including in mobile/smartphones
Existence of digital security or cybersecurity act/legislation online
Existence of features relates accessibility
Existence of features to configure font size, type, color and background color
Existence of free access to government services through kiosks, community centers, post offices, libraries, public spaces of free Wi-Fi
Existence of GIS or other geospatial data or related online services
Existence of help links and references for youth employment
Existence of help, FAQ, contact us features
Existence of linkage between national portal and sectoral/ministerial services of education, employment/labor, environment, health, social protection and justice
Existence of linkage/reference to technical, vocational and tertiary education
Existence of live support functionality
Existence of mobile services in education, employment, environment, health, social protection and justice
Existence of online participation in public issues related to education, employment, environment, health, social protection and justice
Existence of online service for female-headed households, immigrants, migrant workers, refugees and/or internally displaced persons, older persons, persons with disabilities, the poor (below poverty line), women, youth
Existence of online skills training for youths and/or adults
Existence of online tools helping children with disabilities to participate at all levels of education
Existence of open data competitions
Existence of open government data on education, employment, environment, health, social protection and justice
Existence of search and advanced search features
Existence of search engine effectiveness
Existence of security features on the portal
Existence of social networking features
Existence of support for all official languages
Existence of support for authentication or digital ID
Existence of tools to obtain inputs for policy deliberation

Existence of tutorials and/or guidance for using the portal
Existence of up-to-date information on the portal
Existence of user satisfaction of online or mobile services
Ability to access/modify own data
Ability to apply for any visa to enter or transit through this country
Ability to apply for birth certificates online
Ability to apply for building permits online
Ability to apply for business licenses or patents online
Ability to apply for death certificates online
Ability to apply for driver's license online
Ability to apply for environment-related permits online
Ability to apply for government jobs online
Ability to apply for land title registration online
Ability to apply for marriage certificates online
Ability to apply for personal ID cards online
Ability to apply online for criminal record/background clearance
Ability to apply online for government scholarships/fellowships
Ability to apply online for social protection
Ability to customize the national portal(s) to bookmark favorite services
Ability to enroll online for primary or secondary education
Ability to file complaint for public services
Ability to make a police declaration online
Ability to make address change online
Ability to monitor and evaluate existing government procurement contracts
Ability to pay for any government related fees
Ability to pay for water, energy bills online
Ability to receive updates or alerts on environment-related issues
Ability to receive updates or alerts on issues related to education, employment, health, social protection, justice, weather conditions or agricultural technology
Ability to register online for a new business
Ability to register online for vehicle

A.6. Challenges in reviewing the online presence of a country

Selecting the appropriate site/URL at the national level

One of the essential decisions for researchers when undertaking the country assessment is identifying the specific site(s) to review as the national government site for each country. Regardless of the sophistication of e-government in a specific country, the priority for users is to identify which of the many potentially available government sites would be deemed as the "official" national government site—the gateway or starting point for national users. A simple, clear statement at the chosen website is sufficient to start an important step towards providing government information and services to the public in an integrated, usable and easy-to-find manner. Many national sites state that it is the "official" Government site, or "Gateway to Government," or other similar statement.

As has been done for each edition of the *Survey*, the MSQ asked Member States to provide information on the website addresses (URL) of their national portal(s) and the different government ministries. This information was then utilized during the assessment process.

It is usually the case that not all countries provide the appropriate URLs. Thus, some discretion is exerted in deciding whether to use only the websites provided by the Member State. What is noteworthy in this *Survey* is that the researchers not only reviewed the national portals but also undertook exhaustive research on e-participation and open government data, where applicable.

One dilemma that researchers encountered was that several countries provided more than one legitimate national access point. While some have simply not yet consolidated their government entry points into a single site or portal that could be clearly distinguished, others have taken this approach intentionally - that is, offering different access points to different audiences. Considering that the use of integrated portals or multi-portals is emerging as a trend in e-government strategies worldwide, researchers would select the integrated website as a national portal or another portal if it was deemed to be the official homepage of the government. However, more than one site could be scored if the sites were clearly part of a tightly integrated "network" of national sites. It should be noted that during the assessment of the national portals, having more than one national entry is neither a disadvantage nor a benefit.

Some countries offer certain public services at the sub-national or local level rather than the federal level. No country is penalized for offering a service at the sub-national level as opposed to the federal level. In fact, when the issue arises, researchers tend to be inclusive in assessing the matter if the information and/or service can be found at the national portal.

A more difficult problem arises when not only a specific service is located at the local level but when the entire ministerial functions are altogether missing at the national level. If researchers are unable to locate a ministry as per the above described method, then the next step is to find out whether the country in question actually has such a ministry at the national level or whether the functions might be locally administered.

Integrated Portal and Multi-Portal Approaches

Some countries have adopted a different approach to their online e-government portal, by utilizing multiple websites for different topics. Instead of centralizing all the e-information, e-services, e-participation, open data and other online features into one portal, they are made available in separate websites for a more audience-targeted approach. Researchers made sure to examine all possible websites when making the assessment, through links or search engines, to ensure coverage of all government websites where relative information can be found.

Even if the norm recommended is a one-stop-shop type of service delivery or an integrated portal approach, countries that opted for a decentralized approach were not penalized in their score, and the assessment was conducted as if an integrated approach was utilized.

For example, Uruguay has a website www.gub.uy that provide governmental services and open government data, while presidencia.gub.uy provides information for presidential offices and government and uruguaydigital.gub.uy provides the digital agenda of the country and its actualization rates.

Accessing in national official languages

The research team was fully equipped to handle the six official languages of the United Nations, namely Arabic, Chinese, English, French, Russian and Spanish. However, as in previous assessment cycles, the team went beyond this mandate and reviewed each website in the official language of the country, or where that was not possible, in one of the languages available on the site. Translators aided as necessary so that possible errors based on language are reduced to a minimum.

Towards a more people-centric approach

In line with the global trend towards a more people-centric approach and the demand for greater efficiency and cost-effectiveness of the public sector, the MSQ has been designed to reflect this paradigm of e-government. User uptake has been included as a special subject in the *Survey*, encouraging governments to take account not only of the supply side of e-services but also of what is demanded/needed by the target users. Accordingly, the research team was instructed to enforce this approach consistently throughout the entire assessment. Where features could not be found easily, quickly and intuitively, then a site scores poorly.

Data Quality Assurance (QA)

To ensure data quality, UN DESA has put assessment procedures under close monitoring, including by developing a web-based application platform for data collection and storage, preparing the methodological and training guidelines for researchers, and instituting a training programme for both group training or individual hands-on support for researchers in resolving thorny issues.

Among other tasks, team members were asked to justify the selection of URLs and to indicate whether the URLs had been reviewed in past *Surveys*. Regular discussions were held to discuss concerns and ensure consistency of evaluation methods.

UN DESA applied the assessment scores to generate an ordering of online service presence of all United Nations Member States and compared them with the historical results in previous *Surveys* so as to detect possible shortcomings in the process. The new scores are then compared to scores from the previous Surveys by removing the new questions and only considering the ones that remain unchanged. The team was assisted in the research by United Nations interns and volunteers with language skills not otherwise covered by the core group.

Below is a list of the criteria adopted for data QA:

Three levels of assessment/supervision (volunteers, First Report Officer, Second Report Officer)
First check of consistency of data with data patterns by group ranking (VH, H, M, L OSI)
Tuning of OSI questions to stabilize the dataset and to be consistent with EGDI data model
Second check of consistency of data with data patterns by group ranking (VH, H, M, L OSI)
First calculation of OSI
Two levels of assessment/supervision of the outliners - Compensation with MSQ (if doable)
Second calculation of OSI
Data analysis of target countries (outliners or cases with significant drop/improvement …)
Random check of OSI subset of questions / URL - Compensation with MSQ (if doable)
Third calculation of OSI
Second check of consistency of data with data patterns by group ranking (VH, H, M, L OSI)
Check for consistency with other international benchmark reports and 3rd party Sources (MSQ)
Recalculation of OSI (Final)
Data analysis of target countries (those jumping from on group to another)
Final calculation of EGDI

A.7. Member State Questionnaire (MSQ)

As has been done for each edition of the *Survey*, United Nations Member States were requested, through the Member State Questionnaire (MSQ) to provide information on the website addresses (URLs) of their respective national portal(s) as well as those of the different government ministries. Information on efforts in support of e-government development, open government data, e-participation and the designated authority in charge of e-government policies was also requested. 139 Member States - 72 per cent of United Nations membership - returned a completed MSQ. The appropriate submitted sites were then utilized during the assessment process. Information provided in the MSQs was also used in the case studies included in the *Survey*.

The Questionnaire

Member States Questionnaire (MSQ) for the
United Nations E-Government Survey 2020

The objective of this questionnaire is to gather information from the Member States in preparation of the United Nations E-Government Survey 2020.

Please note that these responses do not directly affect the UN E-Government Development Index (EGDI), which is a composite index of Online Service Index (OSI), Telecommunications Infrastructure Index (TII) and Human Capital Index (HCI). UNDESA[1] assesses national portals with the assistance of independent researchers to construct OSI, requests data from the International Telecommunications Union (ITU) and the United Nations Educational, Scientific and Cultural

Date Submitted (DD/MM/YYYY)	Country Name

Organization (UNESCO) to construct TII and HCI respectively. For any questions about this questionnaire, please contact dpidg@un.org.

☐ I/We hereby authorize UNDESA to publish my/our responses as deemed necessary.

I. Institutional Framework

1. What is the official e-government[2] portal at the national level? If more than one, please list all.

2. Please also provide URLs for below specific portals, if exists:
   a. E-services[3]:

1 This questionnaire is conducted by the Division of Public Institutions and Digital Government (DPIDG) of the UNDESA.
2 **E-government or digital government** will be used interchangeably in this survey and is defined as delivering services online and engaging people by using Information and Communication Technologies (ICTs)
3 A specific portal where you can see the list of all online services available for the public

b. E-participation[4]:

c. Open government data:

d. Public procurement:

e. Other major portals at the national level:

3. Please provide **name(s) and URL(s)** of the government agency/department/ministry at the national level in charge of e-government.

4. Does your country have a Chief Information Officer (CIO)5 to manage national cross-agency e-government programs/strategies?

Name:	
Title:	
Organization:	
E-mail:	
Phone:	

5. Please provide **names and URLs** of the government agencies/ministries/departments at the national level in charge of the following:
   a. Planning and Development
   b. Education
   c. Health

4 **E-Participation** is about fostering civic engagement and open, participatory governance through Information and Communications Technologies (ICTs).

5 **CIO** or a similar senior official with a leadership role, sometimes referred as Chief Technology Officer **(CTO)** or Chief Digital Officer **(CDO)**

d. Social Protection and Welfare

e. Employment and Decent Work

f. Environment

g. Energy/Water

h. Finance/Taxation

i. Industry/Trade

II. Strategy and Implementation

6. Is there a **national development strategy** incorporating the Sustainable Development Goals (SDGs)? *(Maximum 250 words)*

7. Is there a national e-government strategy/digital readiness strategy or equivalent? *(Maximum 250 words)*

8. Please check whichever applies.
National e-government strategy or equivalent:

- ☐ has an implementation plan.
- ☐ is aligned with the national development strategy
- ☐ is aligned with the Sustainable Development Goals (SDGs).
- ☐ is aligned with sub-national/local digital development strategy.
- ☐ has an emphasis on digital-first principle
- ☐ has an emphasis on digital by default; digital by design; mobile-first principle
- ☐ has an emphasis on once-only (data) principle
- ☐ has an emphasis to 'leave no one offline' or to 'leave no one behind'; or other specific measures to ensure e-government is accessible by the most vulnerable groups[6]

6 Poor, immigrants, older persons, persons with disabilities, women, youth, indigenous people

- ☐ makes specific reference to e-participation, digital inclusion and/or engagement.
- ☐ makes specific reference to the use of social media in the government.
- ☐ makes specific reference to the use of new technologies7 such as artificial intelligence, blockchain, big data

(If any checked, please explain further. Maximum 250 words)

III. Legal Framework

9. Is there any legal framework on:
   - ☐ access to information such as Freedom of Information Act
   - ☐ personal data protection including digital security
   - ☐ open government data
   - ☐ digital identity
   - ☐ digital certification/signature
   - ☐ e-procurement
   - ☐ digitally publishing government expenditure[8]
   - ☐ data interoperability
   - ☐ digital government as a right

(If any checked, please provide name of the legislation and links. Maximum 250 words)

IV. Usage of online services

10. Do you collect usage statistics of e-government services?
    ☐ Yes ☐ No

11. If yes, do you publish results online and share those with the public institutions concerned? (Max. 250 words)

V. User satisfaction

12. Do you measure satisfaction of citizens on e-government services?
    ☐ Yes ☐ No

13. If yes, do you publish results online and share those with the public institutions concerned? *(Max. 250 words)*

7 Also referring to emerging technologies
8 Related to SDG Indicator 16.6.1

VI. Social Media

14. How does your government use social media at the national level to interact with and engage people in e-government activities? Please also explain if there were any guidelines for government officials on the use of social media. *(Max. 250 words)*

VII. New Technologies

15. Does your government have a specific national strategy on one or more of following new technologies?

☐ Artificial Intelligence (AI) ☐ Blockchain ☐ Big data ☐ Smart cities
☐ Robotics ☐ Internet of Things (IOT)
☐ Quantum computing ☐ Virtual reality
☐ Augmented reality ☐ Other:

(Please explain further including relevant links. Maximum 250 words)

16. Does your government have any government body[9] at the national level working specifically related to the new technologies? *(Please explain further including relevant links. Maximum 250 words)*

VIII. Indicators

17. What is the percentage of the population[10] satisfied with their last experience of online public services? *(Max. 250 words)*

18. What percentage of your GDP is allocated for ICT investment in the public sector? *(Max. 250 words)*

19. What is the proportion of persons employed in central government organizations routinely using ICTs? *(Max. 250 words)*

9 This can be an agency, cabinet, commission, committee, initiative etc.
10 Related to SDG Indicator 16.6.2 Proportion of population satisfied with their last experience of public services. See for all indicators: https://unstats.un.org/sdgs/indicators/Global%20Indicator%20Framework%20after%20refinement_Eng.pdf

20. What is the proportion of persons employed in central government organizations routinely using the Internet? *(Max. 250 words)*

21. If any, what kind of indicators do you collect/use to track digital literacy at the national level? *(Max. 250 words)*

IX. International and Regional Cooperation11

22. Is your government part of any sub-regional, regional or international cooperation on e-government? *(Max. 250 words)*

23. Is your government offering (or planning to offer) support to other countries in the area of e-government? *(Max. 250 words)*

24. Are there any ongoing public-private partnerships and multistakeholder partnerships, focusing on e-government? *(Max. 250 words)*

X. Contact and Additional Information

Name:	
Title:	
E-mail:	
Organization::	

1. Please select whichever applies:
   - ☐ A group of government agencies responded to the questionnaire collectively.
   - ☐ I am authorized and fully knowledgeable to respond to this questionnaire.
   - ☐ I did not have the full information to respond to this questionnaire
   - ☐ I mostly provided my own opinion/assessment rather than official information.
   - ☐ Other: *(Max. 250 words)*

2. How did you hear about this questionnaire?
   - ☐ Directly from UN DESA
   - ☐ From the Mission of my country to the United Nations

11 WSIS Action Line C.11 - International and regional cooperation - https://publicadministration.un.org/wsis10/WSIS-Action-Lines-and-Facilitators

- ☐ United Nations E-Government Survey website
- ☐ LinkedIn
- ☐ Facebook
- ☐ Other: *(Max. 250 words)*

Thank you for taking the time to fill out the Member States Questionnaire (MSQ) 2020.
We appreciate your participation.

Responding Member States

Afghanistan	Democratic Republic of the	Mauritius	Serbia
Albania	Congo	Mexico	Seychelles
Angola	Denmark	Monaco	Sierra Leone
Argentina	Dominican Republic	Mongolia	Singapore
Armenia	Egypt	Montenegro	Slovakia
Australia	El Salvador	Morocco	Slovenia
Austria	Estonia	Myanmar	Solomon Islands
Azerbaijan	Eswatini	Namibia	Somalia
Bahamas	Finland	Nepal	South Africa
Bahrain	France	Netherlands	Spain
Bangladesh	Gambia	New Zealand	Sri Lanka
Belarus	Georgia	Niger	Sudan
Belgium	Germany	Nigeria	Sweden
Belize	Greece	North Macedonia	Switzerland
Benin	Guinea	Norway	Syria
Bhutan	Indonesia	Oman	Tajikistan
Bosnia and Herzegovina	Iran	Pakistan	Thailand
Botswana	Iraq	Palau	Tonga
Brazil	Ireland	Panama	Trinidad & Tobago
Brunei	Israel	Papua New Guinea	Tunisia
Bulgaria	Italy	Paraguay	Turkey
Burkina Faso	Japan	Peru	Tuvalu
Cabo Verde	Jordan	Philippines	Uganda
Cambodia	Kazakhstan	Poland	Ukraine
Cameroon	Kenya	Portugal	United Arab Emirates
Canada	Kiribati	Qatar	United Kingdom
Chile	Kuwait	Republic of Korea	United Republic of
China	Kyrgyzstan	Republic of Moldova	Tanzania
Colombia	Laos	Russia	Uruguay
Costa Rica	Latvia	Rwanda	Uzbekistan
Cote d'Ivoire	Lebanon	Saint Vincent and the	Vanuatu
Croatia	Lithuania	Grenadines	Venezuela
Cuba	Luxembourg	Samoa	Viet Nam
Cyprus	Malaysia	San Marino	Zambia
Czech Republic	Malta	Sao Tome & Principe	Zimbabwe
	Mauritania	Saudi Arabia	

A.8. E-Participation Index (EPI)

The E-Participation Index (EPI) is derived as a supplementary index to the *United Nations E-Government Survey*. It extends the dimension of the *Survey* by focusing on the government use of online services in providing information to its citizens or "e-information sharing", interacting with stakeholders or "e-consultation" and engaging in decision-making processes or "e-decision-making" (See Box A.1)

Box A.1. E-Participation Framework

- E-information: Enabling participation by providing citizens with public information and access to information without or upon demand
- E-consultation: Engaging citizens in contributions to and deliberation on public policies and services
- E-decision-making: Empowering citizens through co-design of policy options and co-production of service components and delivery modalities.

A country's EPI reflects the e-participation mechanisms that are deployed by the government as compared to all other countries. The purpose of this measure is not to prescribe any specific practice, but rather to offer insight into how different countries are using online tools in promoting interaction between the government and its people, as well as among the people, for the benefit of all. As the EPI is a qualitative assessment based on the availability and relevance of participatory services available on government websites, the comparative ranking of countries is for illustrative purposes and only serves as an indicator of the broad trends in promoting citizen engagement. As with the EGDI, the EPI is not intended as an absolute measurement of e-participation, but rather, as an attempt to capture the e-participation performance of counties relative to one another at a point in time.

In the *2020 Survey*, the e-participation questions were carefully reviewed and expanded to reflect current trends and modalities on how governments engage their people in public policy-making, implementation and evaluation. New questions were added to address data publishing and sharing by government agencies. Other updates included: (i) the availability of information on the people's rights to access government information; (ii) feedback from people concerning the improvement of online public services; and (iii) public opinion tools on policy deliberation through social media, online polls and online discussion forums. While EPI provides a useful qualitative analytical tool when comparing the data and ranking of countries for one specific year, caution must be taken in comparing e-participation rankings with past editions of the *Survey*.

Mathematically, the EPI is normalized by taking the total score value for a given country, subtracting the lowest total score for any country in the *Survey* and dividing by the range of total score values for all countries. For example, if country "x" has an e-participation score of 29, and the lowest value of any country is 0 and the highest equal to 38, then the normalized index value for country "x" would be:

$$\text{E} - \text{Participation Index (Country "x")} = \frac{(29 - 0)}{(38 - 0)} = 0.7632$$

The e-participation ranking of countries is determined by the value of EPI through the "standard competition ranking". In standard competition ranking, countries with the same EPI receive the same ranking number and a gap is left in the ranking numbers. This ranking strategy is adopted in

view that if two or more countries tie for a position in the ranking, the positions of all those ranked below them are unaffected. For example, if country A ranks ahead of B and C, both of which share the same EPI value and scores ahead of D, then A is ranked first (1st), B and C are ranked second (2nd) and D is ranked fourth (4th). In 2012, the "modified competition ranking" was used and for comparison reasons, all ranks were adjusted in 2014 and 2016 using the standard competition ranking.

A.9. Local Online Service Index
Methodology

Changes introduced to 2018 LOSI methodology

The methodology used in the current LOSI pilot study (LOSI 2020) is a revised and improved version of the methodology adopted in LOSI 2018. The main differences refer to

(i) the number of cities surveyed,
(ii) the number of indicators considered,
(iii) the number of assessors conducting the assessment, and
(iv) the introduction of a local government questionnaire.

The decision to enlarge the scope of the study was derived from the growing interest of governments in new technologies that has led to continued development of public services' digitalization and e-government systems at the national, regional and local levels, as well as the international interest shown and general positive feedback provided about the first pilot conducted (LOSI 2018). Faced with requests from countries that did not have cities represented in LOSI 2018, the decision was made to increase the number of cities surveyed in 2020.

The change in the number of indicators was a consequence of the effort to closely align LOSI features with those of OSI, the Online Service Index component of the EGDI (Electronic Government Development Index). Some questions were also included to expand the scope of the assessment in an attempt to cover the basic information and services provided in each of the city portals. In this context, 20 indicators were added to LOSI, specifically, 6 indicators in the *Content Provision* criterion, 12 indicators in the *Services Provision* criterion, and 2 indicators in the *Participation and Engagement* criterion. The indicators included in the Content Provision criterion included the existence of a strategy on e-government/digital government development; the provision of information, updates or notifications about weather and natural disaster alerts such as air quality, flooding, earthquake alert, etc.; the availability of information on: people's rights to access government information such as the Freedom of Information Act or Access to Information Act; the availability of information relevant to vulnerable groups; and information about justice and labor issues. The 12 indicators added to the Services Provision criterion include business access and modification of data online, different types of applications such as for: driver's license, environment-related permit, business license or patent, registration of birth, death or marriage certificate, and land title registration; online vehicle registration; reporting of any form of discrimination; and, business tax filing. In the "Participation and Engagement" criterion, the questions added to the LOSI 2020 edition address the provision of e-voting service(s) to support decision-making in local government and information about public meetings of the municipality council.

Notwithstanding the challenges it represents, the increase in the number of assessors per city (two assessors instead of one, as practiced in LOSI 2018) generates more accurate scores and trustworthy assessments. The use of two assessors also requires the existence of a third person (expert team member) to analyse and solve any the discrepancies between the assessor's evaluation.

In 2020, aside from the assessment of the city portals/websites, the methodology applied also included sending out Local Government Questionnaire (LGQ) to the cities/municipalities studied, directed to the cities' Mayors. Of the cities assessed, 25 cities had no direct Mayor's email address nor municipality general email address in the portal and thus, no LGQ was sent. Response to the LGQS was also very low, only 3 cities responded out of 60 actually sent. A copy of the questionnaire is presented below.

Local Government Questionnaire (LGQ) for the
United Nations Local E-Government Survey 2020

The objective of this questionnaire is to gather information from the local governments/ municipalities in preparation of the United Nations E-Government Survey 2020. For the first time in 2018, UN E-Government Survey assessed 40 pilot cities. In the upcoming Survey, the coverage of the cities will be expanded, and assessment of local government websites will continue. The responses will be shared online on the UN E-Government Survey Knowledge base unless otherwise requested. For any questions about this questionnaire, please contact dpidg@un.org.

I. Institutional Framework

1. What is the official e-government portal at the national level? If more than one, please list all.

2. Please also provide URLs for below specific portals, if exists:
   a. E-services:
   b. E-participation:
   c. Open government data:
   d. Public procurement:

3. Does your local/municipality have a Chief Information Officer (CIO) to manage e-Government programs/strategies?

Name:	
Title:	
Organization:	
E-mail:	
Phone:	

II. Strategy and Implementation

1. Is there a local/municipality e-Government Strategy or equivalent?

2. Please check whichever applies. National e-Government Strategy or equivalent:
   - ☐ has an implementation plan.
   - ☐ is aligned with the national development strategy
   - ☐ is aligned with the Sustainable Development Goals (SDGs).
   - ☐ is aligned with sub-national/local digital development strategy.
   - ☐ makes specific reference to e-Participation and/or digital inclusion/engagement.
   - ☐ makes specific reference to social media.
   - ☐ makes specific reference to new technologies such as artificial intelligence,
   - ☐ blockchain, big data etc.
   - ☐ provides other specific measures to ensure e-Government is used by the most vulnerable groups

III. Usage of online services

1. Do you collect usage statistics of e-Government services?
   ☐ Yes ☐ No

2. If yes, do you publish results online and share those with the public institutions concerned?

IV. User satisfaction

1. Do you measure satisfaction on e-Government services?
   ☐ Yes ☐ No

2. If yes, do you publish results online and share those with the public institutions concerned?

3. What is the percentage of the population satisfied with their last experience of online public services?

V. Social Media

1. How do you use social media at the national level to interact with and engage people in e-government activities?

VI. New Technologies

1. Do you have a specific local/municipality strategy on new technologies such as artificial intelligence, blockchain, big data, smart cities, robotics, internet of things, quantum computing, virtual reality, augmented reality etc.?

VII. Contact and Additional Information

Name:	
Title:	
E-mail:	

Organization:	

Please select whichever applies:

- ☐ am authorized and fully knowledgeable to respond to this questionnaire.
- ☐ did not have the full information to respond to this questionnaire
- ☐ mostly provided my own opinion/assessment rather than official information.
- ☐ Other:

Thank you for taking the time to fill out the Local Government Questionnaire (LGQ) 2020. We appreciate your participation.

Assessment Instrument

The Local Online Service Index (LOSI) is a multi-criteria index that captures e-government development at the local level, by assessing information and services provided by local governments through official websites.

It comprises 80 indicators, which are organized into the following four criteria:

(i) Technology;
(ii) Content Provision;
(iii) Services Provision; and
(iv) Participation and Engagement.

The "Technology" criterion focuses on technical features of the websites with the aim of verifying how the website is made available for users. It encompasses aspects such as ease of navigation, accessibility (when considering different browsers, devices and languages available), visual attractiveness, functionality, and reliability.

The focus of the "Content Provision" criterion is on the availability of basic information for the residents, not only related to the municipality, but also to other core areas for societies at large (namely Open Data, smart cities initiatives and use of emerging technologies). It assesses the quality, availability, relevance, and concise presentation of specific information provided on the website. This criterion includes the assessment of issues such as access to contact information about the organizational structure of the municipal government, access to public documents, access to sectorial information (namely on health, education, social security, economy). The presence of website privacy policies is also included, since it has the potential to improve public perception, trust in government, and to enable greater engagement with government.

The criterion of "Services Provision" assesses a set of fundamental services made available by cities through their websites. The emphasis is on the delivery of fundamental electronic services including the analysis of aspects such as online application and delivery of certificates and licenses, employment search/offer, electronic payments, the ability of users to apply or register for municipal events or services online, forms and reports' submission and registration for services, participation in tenders, and e-Procurement. Issues related to electronic authentication are likewise addressed in this criterion. An additional aspect is assessed in this criterion, which is related with how municipalities respond to email requests for information.

The fourth criterion is dedicated to "Participation and Engagement". The main goal is to assess the existence of relevant online participation mechanisms and initiatives, namely forums, complaint forms and online surveys. Other features considered in this criterion include the availability of social media and the possibility to send comments/suggestions/complaints to the local government, as well as more sophisticated participatory initiatives, such as participatory budget, engagement in online deliberations regarding public policies and services, and empowerment through co-designing of policy options and coproduction of service components and delivery modalities.

The table below lists the set of indicators considered for each criterion.

Technology	Content Provision
Browser compatibility	e-Government/Digital Government strategy
Ease of portal finding	Contact details
Portal loading speed	Organizational structure
Mobile device accessibility	Names and contacts about heads of departments
Navigability	Municipality information
Internal search mechanism	Notifications about weather and natural disaster alerts
Alignment with markup validity standards	Budget related information
Alignment with display standards	Information about procurement announcements
Alignment with accessibility standards	Information about procurement results
Customization of display features	Information about provided services
Foreign language support	Information about municipality partnership with third parties
	Information on rights to access government information
	Facilitation of free internet access
	Health information
	Environmental information
	Education information
	Social welfare information
	Leisure, culture and sports information
	Information relevant to vulnerable groups
	Information about justice issues
	Information about labor issues
	Privacy policy
	Open data policy
	Open data provision
	Open data metadata
	Smart cities initiatives
	Use of emergent technologies
	Online user support
	Guiding information on online services use
	Links for government agencies
	Statistical data and studies provision
	Evidence of portal content update

Service Provision	Participation
Portal authentication	Real time communication
Personal data accessibility	Feedback/complaint submission
Personal data updating	Online public opinion collection
Business data accessibility	Social networking features
Business data updating	Reporting of occurrences in public spaces
Municipality responsiveness emails	Participatory budgeting
Delay of email response	Participation in revision of territorial organization processes
Quality of email response	Announcement of upcoming e-participation activities
Police online declaration	Feedback about e-consultation processes
Online driver's license	e-Voting
Online environment-related permit	Information on the public meetings of the municipality council
Online business license	
Online residentship	
Online birth certificate	
Online death certificate	
Online marriage certificate	
Address change notification	
Online land title registration	
Online vehicle registration	
Online building permit	
e-Procurement service	
Online vacancies	
Report of any form of discrimination	
Online business tax	
Online fees payment	

Each of the criteria forming LOSI is equally considered for calculating the score of each city surveyed to arrive at the final ranking. Although this has been an arguable option amongst the international community, and some countries and experts recommended the attribution of different weights to each criterion, this has not been done so far. Idiosyncrasies of cities and the importance of context-specific local e-government assessment bring additional difficulties in attributing weights in this pilot study with two editions.

Assessment Process

A total **of 100 cities** were considered in the 2020 pilot study. The 100 biggest cities in population in the world were selected. Just one city was chosen per country. Information about cities' population was gathered from "The UN World's Cities in 2018 Data Booklet"[5].

Each municipality website was analysed by two assessors who were **native speakers** of the official language of the city. In cases where a native speaker could not be found, a non-native speaker conducted the assessment. At the next phase, during external validation, these cases were identified and weight was given to the answer of the native speaker.

Using the link provided, assessors navigated in the municipality's website and scored each of the 80 indicators of the assessment grid with a value of 1 or 0, depending on the availability or absence

of the information or functionality in the municipality website. Assessors were also asked to add any comments that might have been used to justify their scoring. The information collected by the assessors was then checked and compared by an expert team member (external validation). Whenever a large number of discrepancies between the scores of the two assessors was found, the survey was sent back to the assessors to allow discussion between themselves with the goal of leading to a decision on the value for each indicator. If, after the assessors' discussions and review some discrepancy still persisted, the expert team member would check and resolve the discrepancies. Other resources have, at times, been used to resolve these situations . The most common situation was to address a privileged contact in his/her personal network and ask forspecific (e.g., seeking guidance from an external contact for a particular indicator).

After external validation and expert team member ultimate revision, all scores from all cities surveyed were closed and LOSI are calculated accordingly. Based on the results obtained, the rankings are generated. Throughout the process, there was close interaction and sharing of concerns among the contributors for this chapter, who resorted to native speakers, even if not participating in the assessment of cities' websites, whenever it was deemed important.

A.10. Country Classifications and Nomenclature in the *Survey*

Regional groupings are taken from the classification of the United Nations Statistics Division. For details, see http://unstats.un.org/unsd/methods/m49/m49regin.htm.

Economies are divided according to 2018 GNI per capita, calculated using the World Bank Atlas method.

For the 2018 GNI per capita, Atlas method data, please see https://data.worldbank.org/indicator/NY.GNP.PCAP.CD?end=2018&name_desc=false&start=1962 (Date accessed : 10 March 2020)

Where data and statistics are reported by income groups, the *Survey* classifies countries according to the World Bank income classification of high, middle and low-income groups.

For details, see https://datahelpdesk.worldbank.org/knowledgebase/articles/906519 . (Date accessed 10 March 2020)

The lists of least developing countries, landlocked developing countries and small island developing countries were obtained from the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS).

For details, see http://www.unohrlls.org/en/ldc/25/

A.11. United Nations e-government knowledge base

The Division for Public Institutions and Digital Government (formerly the Division for Public Administration and Development Management) of the United Nations Department of Economic and Social Affairs maintains the United Nations e-government knowledge base (egovkb) to provide governments and all stakeholders with easy access to data and information on e-government development.

The egovkb is an interactive online tool to view, sort and download information and datasets in open data formats from the *2020 UN E-Government Survey* and as well as previous editions (2003,

2004, 2005, 2008, 2010, 2012. 2014, 2016 and 2018). The egovkb also includes advanced research features such as customizable regional and country comparisons, rankings and country profiles.

For more information and details, see the United Nations e-Government Knowledge Base at https://publicadministration.un.org/egovkb/

A.12. Addendum on COVID-19: methodology note

The Digital Government Branch (DGB) of the Division for Public Institutions and Digital Government (DPIDG) at the United Nations Department of Economic and Social Affairs (UN DESA) conducted an online survey to capture emerging trends and a provide timely analysis of the digital responses of Member States to the COVID-19 pandemic. This survey was active between 18 April and 15 May 2020. Member States shared 514 case studies and the responses facilitated an exchange of information and knowledge on e-government projects and assisted the DGB in preparing the Addendum in the current edition of the Survey. Raw cases submitted can be seen at: https://bit.ly/EGOV_COVID19_APPS.

A.13. Open Government Development Index (OGDI)

The Open Government Development Index (OGDI) is derived as a supplementary index to the Online Service Index (OSI). It extends the dimension of the Survey by focusing on the use of open government data (OGD). The OGDI identifies three key dimensions in its current framework, which are:

(i) policy and institutional framework (as foundation);
(ii) platform (existence of OGD portal and features);
(iii) data availability in various sectors such as health, education, employment, social security, environment and justice) and data application (such as through organizing hackathons).

The OGDI is first piloted using the data of the 2018 UN E-Government Survey[6].

Endnotes

1 ITU (2014) Manual for Measuring ICT Access and Use by Households and Individuals. Available at: http://www.itu.int/dms_pub/itu-d/opb/ind/D-IND-ITCMEAS-2014-PDF-E.pdf

2 Note: The Internet is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network. (Ibid)

3 ITU (2017). Measuring the Information Society Report 2017. Volume 2. ICT country profiles. p. 249. Available at: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume2.pdf

4 2014 E Government Survey

5 Available at https://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2018_data_booklet.pdf.

6 Lei Zheng, W Kwok and others, "Evaluating global open government data: methods and status", ICEGOV 2020 (2020).

Annex Data tables

Annex Table 1. Country Profiles

Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
169	Afghanistan	Asia	Southern Asia	0.3203	0.4118	0.1762	0.3728	Low Income	x	x	
59	Albania	Europe	Southern Europe	0.7399	0.8412	0.5785	0.8001	Upper Middle Income			
120	Algeria	Africa	Northern Africa	0.5173	0.2765	0.5787	0.6966	Upper Middle Income			
80	Andorra	Europe	Southern Europe	0.6881	0.4824	0.8372	0.7448	High Income			
159	Angola	Africa	Middle Africa	0.3847	0.4882	0.1364	0.5295	Lower Middle Income	x		
98	Antigua and Barbuda	Americas	Caribbean	0.6055	0.4471	0.6176	0.7518	High Income			x
32	Argentina	Americas	South America	0.8279	0.8471	0.7265	0.91	Upper Middle Income			
68	Armenia	Asia	Western Asia	0.7136	0.7	0.6536	0.7872	Upper Middle Income		x	
5	Australia	Oceania	Australia and New Zealand	0.9432	0.9471	0.8825	1	High Income			
15	Austria	Europe	Western Europe	0.8914	0.9471	0.824	0.9032	High Income			
70	Azerbaijan	Asia	Western Asia	0.71	0.7059	0.6528	0.7713	Upper Middle Income		x	
73	Bahamas	Americas	Caribbean	0.7017	0.6765	0.6739	0.7546	High Income			x
38	Bahrain	Asia	Western Asia	0.8213	0.7882	0.8319	0.8439	High Income			x
119	Bangladesh	Asia	Southern Asia	0.5189	0.6118	0.3717	0.5731	Lower Middle Income	x		
62	Barbados	Americas	Caribbean	0.7279	0.5765	0.7523	0.8549	High Income			x
40	Belarus	Europe	Eastern Europe	0.8084	0.7059	0.8281	0.8912	Upper Middle Income			
41	Belgium	Europe	Western Europe	0.8047	0.6588	0.8033	0.9521	High Income			
136	Belize	Americas	Central America	0.4548	0.2647	0.4079	0.6919	Upper Middle Income			x
157	Benin	Africa	Western Africa	0.4039	0.5118	0.2595	0.4404	Low Income	x		
103	Bhutan	Asia	Southern Asia	0.5777	0.6824	0.5367	0.5139	Lower Middle Income	x	x	
97	Bolivia (Plurinational State of)	Americas	South America	0.6129	0.5824	0.5184	0.7379	Lower Middle Income		x	
94	Bosnia and Herzegovina	Europe	Southern Europe	0.6372	0.5353	0.6295	0.7468	Upper Middle Income			
115	Botswana	Africa	Southern Africa	0.5383	0.3647	0.5591	0.6911	Upper Middle Income		x	
54	Brazil	Americas	South America	0.7677	0.8706	0.6522	0.7803	Upper Middle Income			
60	Brunei Darussalam	Asia	South-Eastern Asia	0.7389	0.6353	0.8209	0.7605	High Income			
44	Bulgaria	Europe	Eastern Europe	0.798	0.7706	0.7826	0.8408	Upper Middle Income			
164	Burkina Faso	Africa	Western Africa	0.3558	0.4647	0.3117	0.2911	Low Income	x	x	
168	Burundi	Africa	Eastern Africa	0.3227	0.3529	0.126	0.4891	Low Income	x	x	
110	Cabo Verde	Africa	Western Africa	0.5604	0.5	0.5476	0.6337	Lower Middle Income			x

Annex Table 1. Country Profiles

Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
124	Cambodia	Asia	South-Eastern Asia	0.5113	0.4529	0.5466	0.5344	Lower Middle Income	x		
144	Cameroon	Africa	Middle Africa	0.4325	0.4706	0.2299	0.5971	Lower Middle Income			
28	Canada	Americas	Northern America	0.842	0.8412	0.7818	0.9029	High Income			
190	Central African Republic	Africa	Middle Africa	0.1404	0.1294	0.038	0.2539	Low Income	x	x	
189	Chad	Africa	Middle Africa	0.1557	0.2	0.089	0.1782	Low Income	x	x	
34	Chile	Americas	South America	0.8259	0.8529	0.7606	0.8643	High Income			
45	China	Asia	Eastern Asia	0.7948	0.9059	0.7388	0.7396	Upper Middle Income			
67	Colombia	Americas	South America	0.7164	0.7647	0.6122	0.7723	Upper Middle Income			
177	Comoros	Africa	Eastern Africa	0.2799	0.1235	0.2511	0.4652	Lower Middle Income	x		x
160	Congo	Africa	Middle Africa	0.3786	0.3176	0.2361	0.5822	Lower Middle Income			
56	Costa Rica	Americas	Central America	0.7576	0.6824	0.7475	0.8428	Upper Middle Income			
139	Côte d'Ivoire	Africa	Western Africa	0.4457	0.4529	0.5034	0.3808	Lower Middle Income			
51	Croatia	Europe	Southern Europe	0.7745	0.7529	0.7293	0.8414	High Income			
140	Cuba	Americas	Caribbean	0.4439	0.2588	0.2514	0.8215	Upper Middle Income			x
18	Cyprus	Asia	Western Asia	0.8731	0.8706	0.9057	0.8429	High Income			
39	Czech Republic	Europe	Eastern Europe	0.8135	0.7235	0.814	0.903	High Income			
187	Democratic People's Republic of Korea	Asia	Eastern Asia	0.2235	0.0176	0.0127	0.6402	Low Income			
184	Democratic Republic of the Congo	Africa	Middle Africa	0.258	0.1294	0.1144	0.5303	Low Income	x		
1	Denmark	Europe	Northern Europe	0.9758	0.9706	0.9979	0.9588	High Income			
179	Djibouti	Africa	Eastern Africa	0.2728	0.2235	0.2531	0.3418	Lower Middle Income	x		
99	Dominica	Americas	Caribbean	0.6013	0.4471	0.6871	0.6698	Upper Middle Income			x
82	Dominican Republic	Americas	Caribbean	0.6782	0.7647	0.5279	0.7419	Upper Middle Income			x
74	Ecuador	Americas	South America	0.7015	0.8118	0.5133	0.7793	Upper Middle Income			
111	Egypt	Africa	Northern Africa	0.5527	0.5706	0.4683	0.6192	Lower Middle Income			
107	El Salvador	Americas	Central America	0.5697	0.5765	0.5085	0.6242	Lower Middle Income			
185	Equatorial Guinea	Africa	Middle Africa	0.2507	0.0647	0.1327	0.5547	Upper Middle Income			
192	Eritrea	Africa	Eastern Africa	0.1292	0.0118	0	0.3759	Low Income	x		
3	Estonia	Europe	Northern Europe	0.9473	0.9941	0.9212	0.9266	High Income			
128	Eswatini	Africa	Southern Africa	0.4938	0.4882	0.3539	0.6392	Lower Middle Income		x	

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Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
178	Ethiopia	Africa	Eastern Africa	0.274	0.3647	0.1194	0.3378	Low Income	x	x	
90	Fiji	Oceania	Melanesia	0.6585	0.5059	0.6468	0.8227	Upper Middle Income			x
4	Finland	Europe	Northern Europe	0.9452	0.9706	0.9101	0.9549	High Income			
19	France	Europe	Western Europe	0.8718	0.8824	0.8719	0.8612	High Income			
113	Gabon	Africa	Middle Africa	0.5401	0.3235	0.625	0.6719	Upper Middle Income			
181	Gambia (Republic of The)	Africa	Western Africa	0.263	0.0294	0.3967	0.363	Low Income	x		
65	Georgia	Asia	Western Asia	0.7174	0.5882	0.6923	0.8717	Upper Middle Income			
25	Germany	Europe	Western Europe	0.8524	0.7353	0.8856	0.9362	High Income			
101	Ghana	Africa	Western Africa	0.596	0.6353	0.5596	0.593	Lower Middle Income			
42	Greece	Europe	Southern Europe	0.8021	0.7059	0.81	0.8905	High Income			
102	Grenada	Americas	Caribbean	0.5812	0.3412	0.5449	0.8576	Upper Middle Income			x
121	Guatemala	Americas	Central America	0.5155	0.5118	0.4828	0.552	Upper Middle Income			
183	Guinea	Africa	Western Africa	0.2592	0.2176	0.3008	0.2591	Low Income	x		
186	Guinea-Bissau	Africa	Western Africa	0.2316	0.0647	0.2037	0.4265	Low Income	x		x
129	Guyana	Americas	South America	0.4909	0.4647	0.3619	0.6462	Upper Middle Income			x
180	Haiti	Americas	Caribbean	0.2723	0.1882	0.2449	0.3839	Low Income	x		x
138	Honduras	Americas	Central America	0.4486	0.4647	0.3244	0.5568	Lower Middle Income			
52	Hungary	Europe	Eastern Europe	0.7745	0.7471	0.7255	0.8509	High Income			
12	Iceland	Europe	Northern Europe	0.9101	0.7941	0.9838	0.9525	High Income			
100	India	Asia	Southern Asia	0.5964	0.8529	0.3515	0.5848	Lower Middle Income			
88	Indonesia	Asia	South-Eastern Asia	0.6612	0.6824	0.5669	0.7342	Lower Middle Income			
89	Iran (Islamic Republic of)	Asia	Southern Asia	0.6593	0.5882	0.621	0.7686	Upper Middle Income			
143	Iraq	Asia	Western Asia	0.436	0.3353	0.537	0.4358	Upper Middle Income			
27	Ireland	Europe	Northern Europe	0.8433	0.7706	0.81	0.9494	High Income			
30	Israel	Asia	Western Asia	0.8361	0.7471	0.8689	0.8924	High Income			
37	Italy	Europe	Southern Europe	0.8231	0.8294	0.7932	0.8466	High Income			
114	Jamaica	Americas	Caribbean	0.5392	0.3882	0.5151	0.7142	Upper Middle Income			x
14	Japan	Asia	Eastern Asia	0.8989	0.9059	0.9223	0.8684	High Income			
117	Jordan	Asia	Western Asia	0.5309	0.3588	0.554	0.68	Upper Middle Income			
29	Kazakhstan	Asia	Central Asia	0.8375	0.9235	0.7024	0.8866	Upper Middle Income		x	

Annex Table 1. Country Profiles

Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
116	Kenya	Africa	Eastern Africa	0.5326	0.6765	0.3402	0.5812	Lower Middle Income			
145	Kiribati	Oceania	Micronesia	0.432	0.4941	0.1241	0.6778	Lower Middle Income	x		x
46	Kuwait	Asia	Western Asia	0.7913	0.8412	0.7858	0.747	High Income			
83	Kyrgyzstan	Asia	Central Asia	0.6749	0.6471	0.5902	0.7873	Lower Middle Income		x	
167	Lao People's Democratic Republic	Asia	South-Eastern Asia	0.3288	0.1941	0.2383	0.5539	Lower Middle Income	x	x	
49	Latvia	Europe	Northern Europe	0.7798	0.5824	0.8399	0.9172	High Income			
127	Lebanon	Asia	Western Asia	0.4955	0.4176	0.4123	0.6567	Upper Middle Income			
135	Lesotho	Africa	Southern Africa	0.4593	0.3529	0.4497	0.5753	Lower Middle Income	x	x	
182	Liberia	Africa	Western Africa	0.2605	0.2471	0.1411	0.3933	Low Income	x		
162	Libya	Africa	Northern Africa	0.3743	0.0412	0.3459	0.7357	Upper Middle Income			
31	Liechtenstein	Europe	Western Europe	0.8359	0.6588	1	0.8489	High Income			
20	Lithuania	Europe	Northern Europe	0.8665	0.8529	0.8249	0.9218	High Income			
33	Luxembourg	Europe	Western Europe	0.8272	0.7647	0.9072	0.8097	High Income			
172	Madagascar	Africa	Eastern Africa	0.3095	0.2882	0.1096	0.5307	Low Income	x		
165	Malawi	Africa	Eastern Africa	0.348	0.4235	0.1394	0.4812	Low Income	x	x	
47	Malaysia	Asia	South-Eastern Asia	0.7892	0.8529	0.7634	0.7513	Upper Middle Income			
105	Maldives	Asia	Southern Asia	0.574	0.4353	0.5981	0.6886	Upper Middle Income			x
171	Mali	Africa	Western Africa	0.3097	0.3471	0.3546	0.2274	Low Income	x	x	
22	Malta	Europe	Southern Europe	0.8547	0.8118	0.9232	0.829	High Income			
156	Marshall Islands	Oceania	Micronesia	0.4055	0.3412	0.1247	0.7506	Upper Middle Income			x
176	Mauritania	Africa	Western Africa	0.282	0.1	0.3886	0.3575	Lower Middle Income	x		
63	Mauritius	Africa	Eastern Africa	0.7196	0.7	0.6677	0.7911	Upper Middle Income			x
61	Mexico	Americas	Central America	0.7291	0.8235	0.591	0.7727	Upper Middle Income			
161	Micronesia (Federated States of)	Oceania	Micronesia	0.3779	0.3529	0.1061	0.6747	Lower Middle Income			x
64	Monaco	Europe	Western Europe	0.7177	0.4706	0.8639	0.8187	High Income			
92	Mongolia	Asia	Eastern Asia	0.6497	0.5294	0.6135	0.8063	Lower Middle Income		x	
75	Montenegro	Europe	Southern Europe	0.7006	0.5412	0.7366	0.8239	Upper Middle Income			
106	Morocco	Africa	Northern Africa	0.5729	0.5235	0.58	0.6152	Lower Middle Income			
163	Mozambique	Africa	Eastern Africa	0.3564	0.5176	0.1293	0.4222	Low Income	x		
146	Myanmar	Asia	South-Eastern Asia	0.4316	0.2588	0.5234	0.5125	Lower Middle Income	x		

Annex Table 1. Country Profiles

Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
104	Namibia	Africa	Southern Africa	0.5747	0.5235	0.5447	0.6558	Upper Middle Income			
154	Nauru	Oceania	Micronesia	0.415	0.1706	0.4738	0.6006	Upper Middle Income			x
132	Nepal	Asia	Southern Asia	0.4699	0.4	0.4691	0.5405	Low Income	x	x	
10	Netherlands	Europe	Western Europe	0.9228	0.9059	0.9276	0.9349	High Income			
8	New Zealand	Oceania	Australia and New Zealand	0.9339	0.9294	0.9207	0.9516	High Income			
123	Nicaragua	Americas	Central America	0.5139	0.5471	0.3812	0.6133	Lower Middle Income			
188	Niger	Africa	Western Africa	0.1661	0.2941	0.0737	0.1304	Low Income	x	x	
141	Nigeria	Africa	Western Africa	0.4406	0.5176	0.3534	0.4507	Lower Middle Income			
72	North Macedonia	Europe	Southern Europe	0.7083	0.7412	0.6442	0.7395	Upper Middle Income		x	
13	Norway	Europe	Northern Europe	0.9064	0.8765	0.9034	0.9392	High Income			
50	Oman	Asia	Western Asia	0.7749	0.8529	0.6967	0.7751	High Income			
153	Pakistan	Asia	Southern Asia	0.4183	0.6294	0.2437	0.3818	Lower Middle Income			
125	Palau	Oceania	Micronesia	0.5109	0.2765	0.3745	0.8816	High Income			x
84	Panama	Americas	Central America	0.6715	0.6235	0.6488	0.7421	High Income			
175	Papua New Guinea	Oceania	Melanesia	0.2827	0.2235	0.1233	0.5013	Lower Middle Income			x
93	Paraguay	Americas	South America	0.6487	0.7059	0.5435	0.6968	Upper Middle Income		x	
71	Peru	Americas	South America	0.7083	0.7529	0.578	0.794	Upper Middle Income			
77	Philippines	Asia	South-Eastern Asia	0.6892	0.7294	0.5838	0.7544	Lower Middle Income			
24	Poland	Europe	Eastern Europe	0.8531	0.8588	0.8005	0.9001	High Income			
35	Portugal	Europe	Southern Europe	0.8255	0.8353	0.7948	0.8463	High Income			
66	Qatar	Asia	Western Asia	0.7173	0.6588	0.8233	0.6698	High Income			
2	Republic of Korea	Asia	Eastern Asia	0.956	1	0.9684	0.8997	High Income			
79	Republic of Moldova	Europe	Eastern Europe	0.6881	0.7529	0.5683	0.7432	Lower Middle Income		x	
55	Romania	Europe	Eastern Europe	0.7605	0.7235	0.7586	0.7995	Upper Middle Income			
36	Russian Federation	Europe	Eastern Europe	0.8244	0.8176	0.7723	0.8833	Upper Middle Income			
130	Rwanda	Africa	Eastern Africa	0.4789	0.6176	0.2931	0.5261	Low Income	x	x	
95	Saint Kitts and Nevis	Americas	Caribbean	0.6352	0.3941	0.708	0.8035	High Income			x
112	Saint Lucia	Americas	Caribbean	0.5444	0.3824	0.5302	0.7205	Upper Middle Income			x
109	Saint Vincent and the Grenadines	Americas	Caribbean	0.5605	0.4706	0.4894	0.7214	Upper Middle Income			x
149	Samoa	Oceania	Polynesia	0.4219	0.2647	0.2596	0.7414	Upper Middle Income			x

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Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
96	San Marino	Europe	Southern Europe	0.6175	0.2824	0.8153	0.7549	High Income			
155	Sao Tome and Principe	Africa	Middle Africa	0.4074	0.2471	0.3015	0.6736	Lower Middle Income	x		x
43	Saudi Arabia	Asia	Western Asia	0.7991	0.6882	0.8442	0.8648	High Income			
150	Senegal	Africa	Western Africa	0.421	0.4941	0.4358	0.3332	Lower Middle Income	x		
58	Serbia	Europe	Southern Europe	0.7474	0.7941	0.62	0.828	Upper Middle Income			
76	Seychelles	Africa	Eastern Africa	0.692	0.6176	0.6925	0.766	High Income			x
174	Sierra Leone	Africa	Western Africa	0.2931	0.3059	0.259	0.3144	Low Income	x		
11	Singapore	Asia	South-Eastern Asia	0.915	0.9647	0.8899	0.8904	High Income			x
48	Slovakia	Europe	Eastern Europe	0.7817	0.7176	0.7988	0.8286	High Income			
23	Slovenia	Europe	Southern Europe	0.8546	0.8529	0.7853	0.9256	High Income			
166	Solomon Islands	Oceania	Melanesia	0.3442	0.3235	0.2106	0.4985	Lower Middle Income	x		x
191	Somalia	Africa	Eastern Africa	0.1293	0.2941	0.0939	0	Low Income	x		
78	South Africa	Africa	Southern Africa	0.6891	0.7471	0.5832	0.7371	Upper Middle Income			
193	South Sudan	Africa	Eastern Africa	0.0875	0	0.0652	0.1973	Low Income	x	x	
17	Spain	Europe	Southern Europe	0.8801	0.8882	0.8531	0.8989	High Income			
85	Sri Lanka	Asia	Southern Asia	0.6708	0.7176	0.5289	0.766	Upper Middle Income			
170	Sudan	Africa	Northern Africa	0.3154	0.3059	0.2844	0.3559	Lower Middle Income	x		
122	Suriname	Americas	South America	0.5154	0.2882	0.5482	0.7098	Upper Middle Income			x
6	Sweden	Europe	Northern Europe	0.9365	0.9	0.9625	0.9471	High Income			
16	Switzerland	Europe	Western Europe	0.8907	0.8294	0.9482	0.8946	High Income			
131	Syrian Arab Republic	Asia	Western Asia	0.4763	0.5412	0.3804	0.5073	Low Income			
133	Tajikistan	Asia	Central Asia	0.4649	0.3176	0.3496	0.7274	Low Income		x	
57	Thailand	Asia	South-Eastern Asia	0.7565	0.7941	0.7004	0.7751	Upper Middle Income			
134	Timor-Leste	Asia	South-Eastern Asia	0.4649	0.4412	0.3935	0.5599	Lower Middle Income	x		x
147	Togo	Africa	Western Africa	0.4302	0.5	0.2532	0.5373	Low Income	x		
108	Tonga	Oceania	Polynesia	0.5616	0.3765	0.48	0.8283	Upper Middle Income			x
81	Trinidad and Tobago	Americas	Caribbean	0.6785	0.6118	0.6803	0.7434	High Income			x
91	Tunisia	Africa	Northern Africa	0.6526	0.6235	0.6369	0.6974	Lower Middle Income			
53	Turkey	Asia	Western Asia	0.7718	0.8588	0.628	0.8287	Upper Middle Income			
158	Turkmenistan	Asia	Central Asia	0.4034	0.1765	0.3555	0.6783	Upper Middle Income		x	
151	Tuvalu	Oceania	Polynesia	0.4209	0.3	0.2807	0.6821	Upper Middle Income	x		x

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Rank	Country	Region	Sub-region	EGDI 2020	OSI	TII	HCI	Level of Income	LDC	LLDC	SIDS
137	Uganda	Africa	Eastern Africa	0.4499	0.5824	0.2278	0.5395	Low Income	x	x	
69	Ukraine	Europe	Eastern Europe	0.7119	0.6824	0.5942	0.8591	Lower Middle Income			
21	United Arab Emirates	Asia	Western Asia	0.8555	0.9	0.9344	0.732	High Income			
7	United Kingdom of Great Britain and Northern Ireland	Europe	Northern Europe	0.9358	0.9588	0.9195	0.9292	High Income			
152	United Republic of Tanzania	Africa	Eastern Africa	0.4206	0.5529	0.243	0.4659	Low Income	x		
9	United States of America	Americas	Northern America	0.9297	0.9471	0.9182	0.9239	High Income			
26	Uruguay	Americas	South America	0.85	0.8412	0.8574	0.8514	High Income			
87	Uzbekistan	Asia	Central Asia	0.6665	0.7824	0.4736	0.7434	Lower Middle Income		x	
142	Vanuatu	Oceania	Melanesia	0.4403	0.3353	0.3845	0.6012	Lower Middle Income	x		x
118	Venezuela, Bolivarian Republic of	Americas	South America	0.5268	0.3176	0.482	0.7807	Upper Middle Income			
86	Viet Nam	Asia	South-Eastern Asia	0.6667	0.6529	0.6694	0.6779	Lower Middle Income			
173	Yemen	Asia	Western Asia	0.3045	0.3235	0.1757	0.4142	Low Income	x		
148	Zambia	Africa	Eastern Africa	0.4242	0.2588	0.3394	0.6745	Lower Middle Income	x	x	
126	Zimbabwe	Africa	Eastern Africa	0.5019	0.5235	0.3688	0.6135	Lower Middle Income		x	

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Afghanistan	Middle EGDI	M2	169	0.3203	0.4118	0.1762	0.3728
Albania	High EGDI	HV	59	0.7399	0.8412	0.5785	0.8001
Algeria	High EGDI	H1	120	0.5173	0.2765	0.5787	0.6966
Andorra	High EGDI	H3	80	0.6881	0.4824	0.8372	0.7448
Angola	Middle EGDI	M2	159	0.3847	0.4882	0.1364	0.5295
Antigua and Barbuda	High EGDI	H2	98	0.6055	0.4471	0.6176	0.7518
Argentina	Very High EGDI	V2	32	0.8279	0.8471	0.7265	0.91
Armenia	High EGDI	HV	68	0.7136	0.7	0.6536	0.7872
Australia	Very High EGDI	VH	5	0.9432	0.9471	0.8825	1
Austria	Very High EGDI	V3	15	0.8914	0.9471	0.824	0.9032
Azerbaijan	High EGDI	HV	70	0.71	0.7059	0.6528	0.7713
Bahamas	High EGDI	HV	73	0.7017	0.6765	0.6739	0.7546
Bahrain	Very High EGDI	V2	38	0.8213	0.7882	0.8319	0.8439
Bangladesh	High EGDI	H1	119	0.5189	0.6118	0.3717	0.5731
Barbados	High EGDI	HV	62	0.7279	0.5765	0.7523	0.8549
Belarus	Very High EGDI	V2	40	0.8084	0.7059	0.8281	0.8912
Belgium	Very High EGDI	V2	41	0.8047	0.6588	0.8033	0.9521
Belize	Middle EGDI	MH	136	0.4548	0.2647	0.4079	0.6919
Benin	Middle EGDI	M2	157	0.4039	0.5118	0.2595	0.4404
Bhutan	High EGDI	H2	103	0.5777	0.6824	0.5367	0.5139
Bolivia (Plurinational State of)	High EGDI	H2	97	0.6129	0.5824	0.5184	0.7379
Bosnia and Herzegovina	High EGDI	H2	94	0.6372	0.5353	0.6295	0.7468
Botswana	High EGDI	H1	115	0.5383	0.3647	0.5591	0.6911
Brazil	Very High EGDI	V1	54	0.7677	0.8706	0.6522	0.7803
Brunei Darussalam	High EGDI	HV	60	0.7389	0.6353	0.8209	0.7605
Bulgaria	Very High EGDI	V1	44	0.798	0.7706	0.7826	0.8408
Burkina Faso	Middle EGDI	M2	164	0.3558	0.4647	0.3117	0.2911
Burundi	Middle EGDI	M2	168	0.3227	0.3529	0.126	0.4891
Cabo Verde	High EGDI	H2	110	0.5604	0.5	0.5476	0.6337
Cambodia	High EGDI	H1	124	0.5113	0.4529	0.5466	0.5344

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Cameroon	Middle EGDI	M3	144	0.4325	0.4706	0.2299	0.5971
Canada	Very High EGDI	V3	28	0.842	0.8412	0.7818	0.9029
Central African Republic	Low EGDI	L2	190	0.1404	0.1294	0.038	0.2539
Chad	Low EGDI	L3	189	0.1557	0.2	0.089	0.1782
Chile	Very High EGDI	V2	34	0.8259	0.8529	0.7606	0.8643
China	Very High EGDI	V1	45	0.7948	0.9059	0.7388	0.7396
Colombia	High EGDI	HV	67	0.7164	0.7647	0.6122	0.7723
Comoros	Middle EGDI	M1	177	0.2799	0.1235	0.2511	0.4652
Congo	Middle EGDI	M2	160	0.3786	0.3176	0.2361	0.5822
Costa Rica	Very High EGDI	V1	56	0.7576	0.6824	0.7475	0.8428
Côte d'Ivoire	Middle EGDI	MH	139	0.4457	0.4529	0.5034	0.3808
Croatia	Very High EGDI	V1	51	0.7745	0.7529	0.7293	0.8414
Cuba	Middle EGDI	MH	140	0.4439	0.2588	0.2514	0.8215
Cyprus	Very High EGDI	V3	18	0.8731	0.8706	0.9057	0.8429
Czech Republic	Very High EGDI	V2	39	0.8135	0.7235	0.814	0.903
Democratic People's Republic of Korea	Low EGDI	LM	187	0.2235	0.0176	0.0127	0.6402
Democratic Republic of the Congo	Middle EGDI	M1	184	0.258	0.1294	0.1144	0.5303
Denmark	Very High EGDI	VH	1	0.9758	0.9706	0.9979	0.9588
Djibouti	Middle EGDI	M1	179	0.2728	0.2235	0.2531	0.3418
Dominica	High EGDI	H2	99	0.6013	0.4471	0.6871	0.6698
Dominican Republic	High EGDI	H3	82	0.6782	0.7647	0.5279	0.7419
Ecuador	High EGDI	HV	74	0.7015	0.8118	0.5133	0.7793
Egypt	High EGDI	H1	111	0.5527	0.5706	0.4683	0.6192
El Salvador	High EGDI	H2	107	0.5697	0.5765	0.5085	0.6242
Equatorial Guinea	Middle EGDI	M1	185	0.2507	0.0647	0.1327	0.5547
Eritrea	Low EGDI	L1	192	0.1292	0.0118	0	0.3759

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Estonia	Very High EGDI	VH	3	0.9473	0.9941	0.9212	0.9266
Eswatini	Middle EGDI	MH	128	0.4938	0.4882	0.3539	0.6392
Ethiopia	Middle EGDI	M1	178	0.274	0.3647	0.1194	0.3378
Fiji	High EGDI	H3	90	0.6585	0.5059	0.6468	0.8227
Finland	Very High EGDI	VH	4	0.9452	0.9706	0.9101	0.9549
France	Very High EGDI	V3	19	0.8718	0.8824	0.8719	0.8612
Gabon	High EGDI	H1	113	0.5401	0.3235	0.625	0.6719
Gambia (Republic of The)	Middle EGDI	M1	181	0.263	0.0294	0.3967	0.363
Georgia	High EGDI	HV	65	0.7174	0.5882	0.6923	0.8717
Germany	Very High EGDI	V3	25	0.8524	0.7353	0.8856	0.9362
Ghana	High EGDI	H2	101	0.596	0.6353	0.5596	0.593
Greece	Very High EGDI	V2	42	0.8021	0.7059	0.81	0.8905
Grenada	High EGDI	H2	102	0.5812	0.3412	0.5449	0.8576
Guatemala	High EGDI	H1	121	0.5155	0.5118	0.4828	0.552
Guinea	Middle EGDI	M1	183	0.2592	0.2176	0.3008	0.2591
Guinea-Bissau	Low EGDI	LM	186	0.2316	0.0647	0.2037	0.4265
Guyana	Middle EGDI	MH	129	0.4909	0.4647	0.3619	0.6462
Haiti	Middle EGDI	M1	180	0.2723	0.1882	0.2449	0.3839
Honduras	Middle EGDI	MH	138	0.4486	0.4647	0.3244	0.5568
Hungary	Very High EGDI	V1	52	0.7745	0.7471	0.7255	0.8509
Iceland	Very High EGDI	VH	12	0.9101	0.7941	0.9838	0.9525
India	High EGDI	H2	100	0.5964	0.8529	0.3515	0.5848
Indonesia	High EGDI	H3	88	0.6612	0.6824	0.5669	0.7342
Iran (Islamic Republic of)	High EGDI	H3	89	0.6593	0.5882	0.621	0.7686
Iraq	Middle EGDI	M3	143	0.436	0.3353	0.537	0.4358
Ireland	Very High EGDI	V3	27	0.8433	0.7706	0.81	0.9494
Israel	Very High EGDI	V2	30	0.8361	0.7471	0.8689	0.8924
Italy	Very High EGDI	V2	37	0.8231	0.8294	0.7932	0.8466
Jamaica	High EGDI	H1	114	0.5392	0.3882	0.5151	0.7142

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Japan	Very High EGDI	VH	14	0.8989	0.9059	0.9223	0.8684
Jordan	High EGDI	H1	117	0.5309	0.3588	0.554	0.68
Kazakhstan	Very High EGDI	V3	29	0.8375	0.9235	0.7024	0.8866
Kenya	High EGDI	H1	116	0.5326	0.6765	0.3402	0.5812
Kiribati	Middle EGDI	M3	145	0.432	0.4941	0.1241	0.6778
Kuwait	Very High EGDI	V1	46	0.7913	0.8412	0.7858	0.747
Kyrgyzstan	High EGDI	H3	83	0.6749	0.6471	0.5902	0.7873
Lao People's Democratic Republic	Middle EGDI	M2	167	0.3288	0.1941	0.2383	0.5539
Latvia	Very High EGDI	V1	49	0.7798	0.5824	0.8399	0.9172
Lebanon	Middle EGDI	MH	127	0.4955	0.4176	0.4123	0.6567
Lesotho	Middle EGDI	MH	135	0.4593	0.3529	0.4497	0.5753
Liberia	Middle EGDI	M1	182	0.2605	0.2471	0.1411	0.3933
Libya	Middle EGDI	M2	162	0.3743	0.0412	0.3459	0.7357
Liechtenstein	Very High EGDI	V2	31	0.8359	0.6588	1	0.8489
Lithuania	Very High EGDI	V3	20	0.8665	0.8529	0.8249	0.9218
Luxembourg	Very High EGDI	V2	33	0.8272	0.7647	0.9072	0.8097
Madagascar	Middle EGDI	M1	172	0.3095	0.2882	0.1096	0.5307
Malawi	Middle EGDI	M2	165	0.348	0.4235	0.1394	0.4812
Malaysia	Very High EGDI	V1	47	0.7892	0.8529	0.7634	0.7513
Maldives	High EGDI	H2	105	0.574	0.4353	0.5981	0.6886
Mali	Middle EGDI	M2	171	0.3097	0.3471	0.3546	0.2274
Malta	Very High EGDI	V3	22	0.8547	0.8118	0.9232	0.829
Marshall Islands	Middle EGDI	M3	156	0.4055	0.3412	0.1247	0.7506
Mauritania	Middle EGDI	M1	176	0.282	0.1	0.3886	0.3575
Mauritius	High EGDI	HV	63	0.7196	0.7	0.6677	0.7911
Mexico	High EGDI	HV	61	0.7291	0.8235	0.591	0.7727
Micronesia (Federated States of)	Middle EGDI	M2	161	0.3779	0.3529	0.1061	0.6747
Monaco	High EGDI	HV	64	0.7177	0.4706	0.8639	0.8187
Mongolia	High EGDI	H3	92	0.6497	0.5294	0.6135	0.8063

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Montenegro	High EGDI	H3	75	0.7006	0.5412	0.7366	0.8239
Morocco	High EGDI	H2	106	0.5729	0.5235	0.58	0.6152
Mozambique	Middle EGDI	M2	163	0.3564	0.5176	0.1293	0.4222
Myanmar	Middle EGDI	M3	146	0.4316	0.2588	0.5234	0.5125
Namibia	High EGDI	H2	104	0.5747	0.5235	0.5447	0.6558
Nauru	Middle EGDI	M3	154	0.415	0.1706	0.4738	0.6006
Nepal	Middle EGDI	MH	132	0.4699	0.4	0.4691	0.5405
Netherlands	Very High EGDI	VH	10	0.9228	0.9059	0.9276	0.9349
New Zealand	Very High EGDI	VH	8	0.9339	0.9294	0.9207	0.9516
Nicaragua	High EGDI	H1	123	0.5139	0.5471	0.3812	0.6133
Niger	Low EGDI	L3	188	0.1661	0.2941	0.0737	0.1304
Nigeria	Middle EGDI	MH	141	0.4406	0.5176	0.3534	0.4507
North Macedonia	High EGDI	HV	72	0.7083	0.7412	0.6442	0.7395
Norway	Very High EGDI	VH	13	0.9064	0.8765	0.9034	0.9392
Oman	Very High EGDI	V1	50	0.7749	0.8529	0.6967	0.7751
Pakistan	Middle EGDI	M3	153	0.4183	0.6294	0.2437	0.3818
Palau	High EGDI	H1	125	0.5109	0.2765	0.3745	0.8816
Panama	High EGDI	H3	84	0.6715	0.6235	0.6488	0.7421
Papua New Guinea	Middle EGDI	M1	175	0.2827	0.2235	0.1233	0.5013
Paraguay	High EGDI	H2	93	0.6487	0.7059	0.5435	0.6968
Peru	High EGDI	HV	71	0.7083	0.7529	0.578	0.794
Philippines	High EGDI	H3	77	0.6892	0.7294	0.5838	0.7544
Poland	Very High EGDI	V3	24	0.8531	0.8588	0.8005	0.9001
Portugal	Very High EGDI	V2	35	0.8255	0.8353	0.7948	0.8463
Qatar	High EGDI	HV	66	0.7173	0.6588	0.8233	0.6698
Republic of Korea	Very High EGDI	VH	2	0.956	1	0.9684	0.8997
Republic of Moldova	High EGDI	H3	79	0.6881	0.7529	0.5683	0.7432
Romania	Very High EGDI	V1	55	0.7605	0.7235	0.7586	0.7995
Russian Federation	Very High EGDI	V2	36	0.8244	0.8176	0.7723	0.8833
Rwanda	Middle EGDI	MH	130	0.4789	0.6176	0.2931	0.5261

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Saint Kitts and Nevis	High EGDI	H2	95	0.6352	0.3941	0.708	0.8035
Saint Lucia	High EGDI	H1	112	0.5444	0.3824	0.5302	0.7205
Saint Vincent and the Grenadines	High EGDI	H2	109	0.5605	0.4706	0.4894	0.7214
Samoa	Middle EGDI	M3	149	0.4219	0.2647	0.2596	0.7414
San Marino	High EGDI	H2	96	0.6175	0.2824	0.8153	0.7549
Sao Tome and Principe	Middle EGDI	M3	155	0.4074	0.2471	0.3015	0.6736
Saudi Arabia	Very High EGDI	V2	43	0.7991	0.6882	0.8442	0.8648
Senegal	Middle EGDI	M3	150	0.421	0.4941	0.4358	0.3332
Serbia	High EGDI	HV	58	0.7474	0.7941	0.62	0.828
Seychelles	High EGDI	H3	76	0.692	0.6176	0.6925	0.766
Sierra Leone	Middle EGDI	M1	174	0.2931	0.3059	0.259	0.3144
Singapore	Very High EGDI	VH	11	0.915	0.9647	0.8899	0.8904
Slovakia	Very High EGDI	V1	48	0.7817	0.7176	0.7988	0.8286
Slovenia	Very High EGDI	V3	23	0.8546	0.8529	0.7853	0.9256
Solomon Islands	Middle EGDI	M2	166	0.3442	0.3235	0.2106	0.4985
Somalia	Low EGDI	L2	191	0.1293	0.2941	0.0939	0
South Africa	High EGDI	H3	78	0.6891	0.7471	0.5832	0.7371
South Sudan	Low EGDI	L1	193	0.0875	0	0.0652	0.1973
Spain	Very High EGDI	V3	17	0.8801	0.8882	0.8531	0.8989
Sri Lanka	High EGDI	H3	85	0.6708	0.7176	0.5289	0.766
Sudan	Middle EGDI	M2	170	0.3154	0.3059	0.2844	0.3559
Suriname	High EGDI	H1	122	0.5154	0.2882	0.5482	0.7098
Sweden	Very High EGDI	VH	6	0.9365	0.9	0.9625	0.9471
Switzerland	Very High EGDI	V3	16	0.8907	0.8294	0.9482	0.8946
Syrian Arab Republic	Middle EGDI	MH	131	0.4763	0.5412	0.3804	0.5073
Tajikistan	Middle EGDI	MH	133	0.4649	0.3176	0.3496	0.7274
Thailand	Very High EGDI	V1	57	0.7565	0.7941	0.7004	0.7751
Timor-Leste	Middle EGDI	MH	134	0.4649	0.4412	0.3935	0.5599
Togo	Middle EGDI	M3	147	0.4302	0.5	0.2532	0.5373

Annex Table 2. E-Government Development Index (EGDI)

Country	EGDI Level	Rating Class	Rank	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Tonga	High EGDI	H2	108	0.5616	0.3765	0.48	0.8283
Trinidad and Tobago	High EGDI	H3	81	0.6785	0.6118	0.6803	0.7434
Tunisia	High EGDI	H3	91	0.6526	0.6235	0.6369	0.6974
Turkey	Very High EGDI	V1	53	0.7718	0.8588	0.628	0.8287
Turkmenistan	Middle EGDI	M2	158	0.4034	0.1765	0.3555	0.6783
Tuvalu	Middle EGDI	M3	151	0.4209	0.3	0.2807	0.6821
Uganda	Middle EGDI	MH	137	0.4499	0.5824	0.2278	0.5395
Ukraine	High EGDI	HV	69	0.7119	0.6824	0.5942	0.8591
United Arab Emirates	Very High EGDI	V3	21	0.8555	0.9	0.9344	0.732
United Kingdom of Great Britain and Northern Ireland	Very High EGDI	VH	7	0.9358	0.9588	0.9195	0.9292
United Republic of Tanzania	Middle EGDI	M3	152	0.4206	0.5529	0.243	0.4659
United States of America	Very High EGDI	VH	9	0.9297	0.9471	0.9182	0.9239
Uruguay	Very High EGDI	V3	26	0.85	0.8412	0.8574	0.8514
Uzbekistan	High EGDI	H3	87	0.6665	0.7824	0.4736	0.7434
Vanuatu	Middle EGDI	M3	142	0.4403	0.3353	0.3845	0.6012
Venezuela, Bolivarian Republic of	High EGDI	H1	118	0.5268	0.3176	0.482	0.7807
Viet Nam	High EGDI	H3	86	0.6667	0.6529	0.6694	0.6779
Yemen	Middle EGDI	M1	173	0.3045	0.3235	0.1757	0.4142
Zambia	Middle EGDI	M3	148	0.4242	0.2588	0.3394	0.6745
Zimbabwe	High EGDI	H1	126	0.5019	0.5235	0.3688	0.6135

Annex Table 3. Regional and Economic Groupings for E-Government Development Index (EGDI)

Region / Grouping	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
Africa	0.3914	0.3704	0.3165	0.4874
Americas	0.6341	0.5808	0.5763	0.7453
Asia	0.6373	0.6249	0.5893	0.6977
Europe	0.817	0.7655	0.8162	0.8691
Oceania	0.5106	0.4172	0.3851	0.7295
World	0.5988	0.562	0.5464	0.688
Least Developed Countries	0.3387	0.3289	0.2523	0.4348
Land Locked Developing Countries	0.4682	0.4693	0.3748	0.5604
Small Island Developing States	0.5255	0.4161	0.4607	0.6996
Levels of Income	**EGDI**	**Online Service Index**	**Telecommunications Infrastructure Index**	**Human Capital Index**
High income	0.8195	0.7663	0.8301	0.862
Upper middle income	0.6204	0.5515	0.5618	0.7478
Lower middle income	0.4932	0.4864	0.4036	0.5895
Low income	0.3021	0.3112	0.1984	0.3967

Annex Table 4. E-Government Development Index (EGDI) by region - AFRICA

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
120	Algeria	Northern Africa	0.5173	0.2765	0.5787	0.6966
159	Angola	Middle Africa	0.3847	0.4882	0.1364	0.5295
157	Benin	Western Africa	0.4039	0.5118	0.2595	0.4404
115	Botswana	Southern Africa	0.5383	0.3647	0.5591	0.6911
164	Burkina Faso	Western Africa	0.3558	0.4647	0.3117	0.2911
168	Burundi	Eastern Africa	0.3227	0.3529	0.126	0.4891
110	Cabo Verde	Western Africa	0.5604	0.5	0.5476	0.6337
144	Cameroon	Middle Africa	0.4325	0.4706	0.2299	0.5971
190	Central African Republic	Middle Africa	0.1404	0.1294	0.038	0.2539
189	Chad	Middle Africa	0.1557	0.2	0.089	0.1782
177	Comoros	Eastern Africa	0.2799	0.1235	0.2511	0.4652
160	Congo	Middle Africa	0.3786	0.3176	0.2361	0.5822
139	Côte d'Ivoire	Western Africa	0.4457	0.4529	0.5034	0.3808
184	Democratic Republic of the Congo	Middle Africa	0.258	0.1294	0.1144	0.5303
179	Djibouti	Eastern Africa	0.2728	0.2235	0.2531	0.3418
111	Egypt	Northern Africa	0.5527	0.5706	0.4683	0.6192
185	Equatorial Guinea	Middle Africa	0.2507	0.0647	0.1327	0.5547
192	Eritrea	Eastern Africa	0.1292	0.0118	0	0.3759
128	Eswatini	Southern Africa	0.4938	0.4882	0.3539	0.6392
178	Ethiopia	Eastern Africa	0.274	0.3647	0.1194	0.3378
113	Gabon	Middle Africa	0.5401	0.3235	0.625	0.6719
181	Gambia (Republic of The)	Western Africa	0.263	0.0294	0.3967	0.363
101	Ghana	Western Africa	0.596	0.6353	0.5596	0.593
183	Guinea	Western Africa	0.2592	0.2176	0.3008	0.2591
186	Guinea-Bissau	Western Africa	0.2316	0.0647	0.2037	0.4265
116	Kenya	Eastern Africa	0.5326	0.6765	0.3402	0.5812
135	Lesotho	Southern Africa	0.4593	0.3529	0.4497	0.5753
182	Liberia	Western Africa	0.2605	0.2471	0.1411	0.3933
162	Libya	Northern Africa	0.3743	0.0412	0.3459	0.7357
172	Madagascar	Eastern Africa	0.3095	0.2882	0.1096	0.5307

Annex Table 4. E-Government Development Index (EGDI) by region - AFRICA

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
165	Malawi	Eastern Africa	0.348	0.4235	0.1394	0.4812
171	Mali	Western Africa	0.3097	0.3471	0.3546	0.2274
176	Mauritania	Western Africa	0.282	0.1	0.3886	0.3575
63	Mauritius	Eastern Africa	0.7196	0.7	0.6677	0.7911
106	Morocco	Northern Africa	0.5729	0.5235	0.58	0.6152
163	Mozambique	Eastern Africa	0.3564	0.5176	0.1293	0.4222
104	Namibia	Southern Africa	0.5747	0.5235	0.5447	0.6558
188	Niger	Western Africa	0.1661	0.2941	0.0737	0.1304
141	Nigeria	Western Africa	0.4406	0.5176	0.3534	0.4507
130	Rwanda	Eastern Africa	0.4789	0.6176	0.2931	0.5261
155	Sao Tome and Principe	Middle Africa	0.4074	0.2471	0.3015	0.6736
150	Senegal	Western Africa	0.421	0.4941	0.4358	0.3332
76	Seychelles	Eastern Africa	0.692	0.6176	0.6925	0.766
174	Sierra Leone	Western Africa	0.2931	0.3059	0.259	0.3144
191	Somalia	Eastern Africa	0.1293	0.2941	0.0939	0
78	South Africa	Southern Africa	0.6891	0.7471	0.5832	0.7371
193	South Sudan	Eastern Africa	0.0875	0	0.0652	0.1973
170	Sudan	Northern Africa	0.3154	0.3059	0.2844	0.3559
147	Togo	Western Africa	0.4302	0.5	0.2532	0.5373
91	Tunisia	Northern Africa	0.6526	0.6235	0.6369	0.6974
137	Uganda	Eastern Africa	0.4499	0.5824	0.2278	0.5395
152	United Republic of Tanzania	Eastern Africa	0.4206	0.5529	0.243	0.4659
148	Zambia	Eastern Africa	0.4242	0.2588	0.3394	0.6745
126	Zimbabwe	Eastern Africa	0.5019	0.5235	0.3688	0.6135

Annex Table 5. E-Government Development Index (EGDI) by region - AMERICAS

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
98	Antigua and Barbuda	Caribbean	0.6055	0.4471	0.6176	0.7518
32	Argentina	South America	0.8279	0.8471	0.7265	0.91
73	Bahamas	Caribbean	0.7017	0.6765	0.6739	0.7546
62	Barbados	Caribbean	0.7279	0.5765	0.7523	0.8549
136	Belize	Central America	0.4548	0.2647	0.4079	0.6919
97	Bolivia (Plurinational State of)	South America	0.6129	0.5824	0.5184	0.7379
54	Brazil	South America	0.7677	0.8706	0.6522	0.7803
28	Canada	Northern America	0.842	0.8412	0.7818	0.9029
34	Chile	South America	0.8259	0.8529	0.7606	0.8643
67	Colombia	South America	0.7164	0.7647	0.6122	0.7723
56	Costa Rica	Central America	0.7576	0.6824	0.7475	0.8428
140	Cuba	Caribbean	0.4439	0.2588	0.2514	0.8215
99	Dominica	Caribbean	0.6013	0.4471	0.6871	0.6698
82	Dominican Republic	Caribbean	0.6782	0.7647	0.5279	0.7419
74	Ecuador	South America	0.7015	0.8118	0.5133	0.7793
107	El Salvador	Central America	0.5697	0.5765	0.5085	0.6242
102	Grenada	Caribbean	0.5812	0.3412	0.5449	0.8576
121	Guatemala	Central America	0.5155	0.5118	0.4828	0.552
129	Guyana	South America	0.4909	0.4647	0.3619	0.6462
180	Haiti	Caribbean	0.2723	0.1882	0.2449	0.3839
138	Honduras	Central America	0.4486	0.4647	0.3244	0.5568
114	Jamaica	Caribbean	0.5392	0.3882	0.5151	0.7142
61	Mexico	Central America	0.7291	0.8235	0.591	0.7727
123	Nicaragua	Central America	0.5139	0.5471	0.3812	0.6133
84	Panama	Central America	0.6715	0.6235	0.6488	0.7421
93	Paraguay	South America	0.6487	0.7059	0.5435	0.6968
71	Peru	South America	0.7083	0.7529	0.578	0.794
95	Saint Kitts and Nevis	Caribbean	0.6352	0.3941	0.708	0.8035
112	Saint Lucia	Caribbean	0.5444	0.3824	0.5302	0.7205
109	Saint Vincent and the Grenadines	Caribbean	0.5605	0.4706	0.4894	0.7214
122	Suriname	South America	0.5154	0.2882	0.5482	0.7098
81	Trinidad and Tobago	Caribbean	0.6785	0.6118	0.6803	0.7434

Annex Table 5. E-Government Development Index (EGDI) by region - AMERICAS

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
9	United States of America	Northern America	0.9297	0.9471	0.9182	0.9239
26	Uruguay	South America	0.85	0.8412	0.8574	0.8514
118	Venezuela, Bolivarian Republic of	South America	0.5268	0.3176	0.482	0.7807

Annex Table 6. E-Government Development Index EGDI by region - ASIA

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
169	Afghanistan	Southern Asia	0.3203	0.4118	0.1762	0.3728
68	Armenia	Western Asia	0.7136	0.7	0.6536	0.7872
70	Azerbaijan	Western Asia	0.71	0.7059	0.6528	0.7713
38	Bahrain	Western Asia	0.8213	0.7882	0.8319	0.8439
119	Bangladesh	Southern Asia	0.5189	0.6118	0.3717	0.5731
103	Bhutan	Southern Asia	0.5777	0.6824	0.5367	0.5139
60	Brunei Darussalam	South-Eastern Asia	0.7389	0.6353	0.8209	0.7605
124	Cambodia	South-Eastern Asia	0.5113	0.4529	0.5466	0.5344
45	China	Eastern Asia	0.7948	0.9059	0.7388	0.7396
18	Cyprus	Western Asia	0.8731	0.8706	0.9057	0.8429
187	Democratic People's Republic of Korea	Eastern Asia	0.2235	0.0176	0.0127	0.6402
65	Georgia	Western Asia	0.7174	0.5882	0.6923	0.8717
100	India	Southern Asia	0.5964	0.8529	0.3515	0.5848
88	Indonesia	South-Eastern Asia	0.6612	0.6824	0.5669	0.7342
89	Iran (Islamic Republic of)	Southern Asia	0.6593	0.5882	0.621	0.7686
143	Iraq	Western Asia	0.436	0.3353	0.537	0.4358
30	Israel	Western Asia	0.8361	0.7471	0.8689	0.8924
14	Japan	Eastern Asia	0.8989	0.9059	0.9223	0.8684
117	Jordan	Western Asia	0.5309	0.3588	0.554	0.68
29	Kazakhstan	Central Asia	0.8375	0.9235	0.7024	0.8866
46	Kuwait	Western Asia	0.7913	0.8412	0.7858	0.747
83	Kyrgyzstan	Central Asia	0.6749	0.6471	0.5902	0.7873
167	Lao People's Democratic Republic	South-Eastern Asia	0.3288	0.1941	0.2383	0.5539
127	Lebanon	Western Asia	0.4955	0.4176	0.4123	0.6567
47	Malaysia	South-Eastern Asia	0.7892	0.8529	0.7634	0.7513
105	Maldives	Southern Asia	0.574	0.4353	0.5981	0.6886
92	Mongolia	Eastern Asia	0.6497	0.5294	0.6135	0.8063

Annex Table 6. E-Government Development Index EGDI by region - ASIA

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
146	Myanmar	South-Eastern Asia	0.4316	0.2588	0.5234	0.5125
132	Nepal	Southern Asia	0.4699	0.4	0.4691	0.5405
50	Oman	Western Asia	0.7749	0.8529	0.6967	0.7751
153	Pakistan	Southern Asia	0.4183	0.6294	0.2437	0.3818
77	Philippines	South-Eastern Asia	0.6892	0.7294	0.5838	0.7544
66	Qatar	Western Asia	0.7173	0.6588	0.8233	0.6698
2	Republic of Korea	Eastern Asia	0.956	1	0.9684	0.8997
43	Saudi Arabia	Western Asia	0.7991	0.6882	0.8442	0.8648
11	Singapore	South-Eastern Asia	0.915	0.9647	0.8899	0.8904
85	Sri Lanka	Southern Asia	0.6708	0.7176	0.5289	0.766
131	Syrian Arab Republic	Western Asia	0.4763	0.5412	0.3804	0.5073
133	Tajikistan	Central Asia	0.4649	0.3176	0.3496	0.7274
57	Thailand	South-Eastern Asia	0.7565	0.7941	0.7004	0.7751
134	Timor-Leste	South-Eastern Asia	0.4649	0.4412	0.3935	0.5599
53	Turkey	Western Asia	0.7718	0.8588	0.628	0.8287
158	Turkmenistan	Central Asia	0.4034	0.1765	0.3555	0.6783
21	United Arab Emirates	Western Asia	0.8555	0.9	0.9344	0.732
87	Uzbekistan	Central Asia	0.6665	0.7824	0.4736	0.7434
86	Viet Nam	South-Eastern Asia	0.6667	0.6529	0.6694	0.6779
173	Yemen	Western Asia	0.3045	0.3235	0.1757	0.4142

Annex Table 7. E-Government Development Index EGDI by region - EUROPE

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
59	Albania	Southern Europe	0.7399	0.8412	0.5785	0.8001
80	Andorra	Southern Europe	0.6881	0.4824	0.8372	0.7448
15	Austria	Western Europe	0.8914	0.9471	0.824	0.9032
40	Belarus	Eastern Europe	0.8084	0.7059	0.8281	0.8912
41	Belgium	Western Europe	0.8047	0.6588	0.8033	0.9521
94	Bosnia and Herzegovina	Southern Europe	0.6372	0.5353	0.6295	0.7468
44	Bulgaria	Eastern Europe	0.798	0.7706	0.7826	0.8408
51	Croatia	Southern Europe	0.7745	0.7529	0.7293	0.8414
39	Czech Republic	Eastern Europe	0.8135	0.7235	0.814	0.903
1	Denmark	Northern Europe	0.9758	0.9706	0.9979	0.9588
3	Estonia	Northern Europe	0.9473	0.9941	0.9212	0.9266
4	Finland	Northern Europe	0.9452	0.9706	0.9101	0.9549
19	France	Western Europe	0.8718	0.8824	0.8719	0.8612
25	Germany	Western Europe	0.8524	0.7353	0.8856	0.9362
42	Greece	Southern Europe	0.8021	0.7059	0.81	0.8905
52	Hungary	Eastern Europe	0.7745	0.7471	0.7255	0.8509
12	Iceland	Northern Europe	0.9101	0.7941	0.9838	0.9525
27	Ireland	Northern Europe	0.8433	0.7706	0.81	0.9494
37	Italy	Southern Europe	0.8231	0.8294	0.7932	0.8466
49	Latvia	Northern Europe	0.7798	0.5824	0.8399	0.9172
31	Liechtenstein	Western Europe	0.8359	0.6588	1	0.8489
20	Lithuania	Northern Europe	0.8665	0.8529	0.8249	0.9218
33	Luxembourg	Western Europe	0.8272	0.7647	0.9072	0.8097
22	Malta	Southern Europe	0.8547	0.8118	0.9232	0.829
64	Monaco	Western Europe	0.7177	0.4706	0.8639	0.8187
75	Montenegro	Southern Europe	0.7006	0.5412	0.7366	0.8239
10	Netherlands	Western Europe	0.9228	0.9059	0.9276	0.9349
72	North Macedonia	Southern Europe	0.7083	0.7412	0.6442	0.7395
13	Norway	Northern Europe	0.9064	0.8765	0.9034	0.9392
24	Poland	Eastern Europe	0.8531	0.8588	0.8005	0.9001
35	Portugal	Southern Europe	0.8255	0.8353	0.7948	0.8463
79	Republic of Moldova	Eastern Europe	0.6881	0.7529	0.5683	0.7432
55	Romania	Eastern Europe	0.7605	0.7235	0.7586	0.7995
36	Russian Federation	Eastern Europe	0.8244	0.8176	0.7723	0.8833
96	San Marino	Southern Europe	0.6175	0.2824	0.8153	0.7549
58	Serbia	Southern Europe	0.7474	0.7941	0.62	0.828
48	Slovakia	Eastern Europe	0.7817	0.7176	0.7988	0.8286
23	Slovenia	Southern Europe	0.8546	0.8529	0.7853	0.9256
17	Spain	Southern Europe	0.8801	0.8882	0.8531	0.8989

Annex Table 7. E-Government Development Index EGDI by region - EUROPE

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
6	Sweden	Northern Europe	0.9365	0.9	0.9625	0.9471
16	Switzerland	Western Europe	0.8907	0.8294	0.9482	0.8946
69	Ukraine	Eastern Europe	0.7119	0.6824	0.5942	0.8591
7	United Kingdom of Great Britain and Northern Ireland	Northern Europe	0.9358	0.9588	0.9195	0.9292

Annex Table 8. E-Government Development Index EGDI by region - OCEANIA

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
5	Australia	Australia and New Zealand	0.9432	0.9471	0.8825	1
90	Fiji	Melanesia	0.6585	0.5059	0.6468	0.8227
145	Kiribati	Micronesia	0.432	0.4941	0.1241	0.6778
156	Marshall Islands	Micronesia	0.4055	0.3412	0.1247	0.7506
161	Micronesia (Federated States of)	Micronesia	0.3779	0.3529	0.1061	0.6747
154	Nauru	Micronesia	0.415	0.1706	0.4738	0.6006
8	New Zealand	Australia and New Zealand	0.9339	0.9294	0.9207	0.9516
125	Palau	Micronesia	0.5109	0.2765	0.3745	0.8816
175	Papua New Guinea	Melanesia	0.2827	0.2235	0.1233	0.5013
149	Samoa	Polynesia	0.4219	0.2647	0.2596	0.7414
166	Solomon Islands	Melanesia	0.3442	0.3235	0.2106	0.4985
108	Tonga	Polynesia	0.5616	0.3765	0.48	0.8283
151	Tuvalu	Polynesia	0.4209	0.3	0.2807	0.6821
142	Vanuatu	Melanesia	0.4403	0.3353	0.3845	0.6012

Annex Table 9. E-Government Development Index EGDI of Least Developed Countries(LDCs)

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
169	Afghanistan	Southern Asia	0.3203	0.4118	0.1762	0.3728
159	Angola	Middle Africa	0.3847	0.4882	0.1364	0.5295
119	Bangladesh	Southern Asia	0.5189	0.6118	0.3717	0.5731
157	Benin	Western Africa	0.4039	0.5118	0.2595	0.4404
103	Bhutan	Southern Asia	0.5777	0.6824	0.5367	0.5139
164	Burkina Faso	Western Africa	0.3558	0.4647	0.3117	0.2911
168	Burundi	Eastern Africa	0.3227	0.3529	0.126	0.4891
124	Cambodia	South-Eastern Asia	0.5113	0.4529	0.5466	0.5344
190	Central African Republic	Middle Africa	0.1404	0.1294	0.038	0.2539
189	Chad	Middle Africa	0.1557	0.2	0.089	0.1782
177	Comoros	Eastern Africa	0.2799	0.1235	0.2511	0.4652
184	Democratic Republic of the Congo	Middle Africa	0.258	0.1294	0.1144	0.5303
179	Djibouti	Eastern Africa	0.2728	0.2235	0.2531	0.3418
192	Eritrea	Eastern Africa	0.1292	0.0118	0	0.3759
178	Ethiopia	Eastern Africa	0.274	0.3647	0.1194	0.3378
181	Gambia (Republic of The)	Western Africa	0.263	0.0294	0.3967	0.363
183	Guinea	Western Africa	0.2592	0.2176	0.3008	0.2591
186	Guinea-Bissau	Western Africa	0.2316	0.0647	0.2037	0.4265
180	Haiti	Caribbean	0.2723	0.1882	0.2449	0.3839
145	Kiribati	Micronesia	0.432	0.4941	0.1241	0.6778
167	Lao People's Democratic Republic	South-Eastern Asia	0.3288	0.1941	0.2383	0.5539
135	Lesotho	Southern Africa	0.4593	0.3529	0.4497	0.5753
182	Liberia	Western Africa	0.2605	0.2471	0.1411	0.3933
172	Madagascar	Eastern Africa	0.3095	0.2882	0.1096	0.5307
165	Malawi	Eastern Africa	0.348	0.4235	0.1394	0.4812

Annex Table 9. E-Government Development Index EGDI of Least Developed Countries(LDCs)

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
171	Mali	Western Africa	0.3097	0.3471	0.3546	0.2274
176	Mauritania	Western Africa	0.282	0.1	0.3886	0.3575
163	Mozambique	Eastern Africa	0.3564	0.5176	0.1293	0.4222
146	Myanmar	South-Eastern Asia	0.4316	0.2588	0.5234	0.5125
132	Nepal	Southern Asia	0.4699	0.4	0.4691	0.5405
188	Niger	Western Africa	0.1661	0.2941	0.0737	0.1304
130	Rwanda	Eastern Africa	0.4789	0.6176	0.2931	0.5261
155	Sao Tome and Principe	Middle Africa	0.4074	0.2471	0.3015	0.6736
150	Senegal	Western Africa	0.421	0.4941	0.4358	0.3332
174	Sierra Leone	Western Africa	0.2931	0.3059	0.259	0.3144
166	Solomon Islands	Melanesia	0.3442	0.3235	0.2106	0.4985
191	Somalia	Eastern Africa	0.1293	0.2941	0.0939	0
193	South Sudan	Eastern Africa	0.0875	0	0.0652	0.1973
170	Sudan	Northern Africa	0.3154	0.3059	0.2844	0.3559
134	Timor-Leste	South-Eastern Asia	0.4649	0.4412	0.3935	0.5599
147	Togo	Western Africa	0.4302	0.5	0.2532	0.5373
151	Tuvalu	Polynesia	0.4209	0.3	0.2807	0.6821
137	Uganda	Eastern Africa	0.4499	0.5824	0.2278	0.5395
152	United Republic of Tanzania	Eastern Africa	0.4206	0.5529	0.243	0.4659
142	Vanuatu	Melanesia	0.4403	0.3353	0.3845	0.6012
173	Yemen	Western Asia	0.3045	0.3235	0.1757	0.4142
148	Zambia	Eastern Africa	0.4242	0.2588	0.3394	0.6745

Annex Table 10. E-Government Development Index EGDI of Landlocked Developing Counties(LLDCs)

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
169	Afghanistan	Southern Asia	0.3203	0.4118	0.1762	0.3728
68	Armenia	Western Asia	0.7136	0.7	0.6536	0.7872
70	Azerbaijan	Western Asia	0.71	0.7059	0.6528	0.7713
103	Bhutan	Southern Asia	0.5777	0.6824	0.5367	0.5139
97	Bolivia (Plurinational State of)	South America	0.6129	0.5824	0.5184	0.7379
115	Botswana	Southern Africa	0.5383	0.3647	0.5591	0.6911
164	Burkina Faso	Western Africa	0.3558	0.4647	0.3117	0.2911
168	Burundi	Eastern Africa	0.3227	0.3529	0.126	0.4891
190	Central African Republic	Middle Africa	0.1404	0.1294	0.038	0.2539
189	Chad	Middle Africa	0.1557	0.2	0.089	0.1782
128	Eswatini	Southern Africa	0.4938	0.4882	0.3539	0.6392
178	Ethiopia	Eastern Africa	0.274	0.3647	0.1194	0.3378
29	Kazakhstan	Central Asia	0.8375	0.9235	0.7024	0.8866
83	Kyrgyzstan	Central Asia	0.6749	0.6471	0.5902	0.7873
167	Lao People's Democratic Republic	South-Eastern Asia	0.3288	0.1941	0.2383	0.5539
135	Lesotho	Southern Africa	0.4593	0.3529	0.4497	0.5753
165	Malawi	Eastern Africa	0.348	0.4235	0.1394	0.4812
171	Mali	Western Africa	0.3097	0.3471	0.3546	0.2274
92	Mongolia	Eastern Asia	0.6497	0.5294	0.6135	0.8063
132	Nepal	Southern Asia	0.4699	0.4	0.4691	0.5405
188	Niger	Western Africa	0.1661	0.2941	0.0737	0.1304
72	North Macedonia	Southern Europe	0.7083	0.7412	0.6442	0.7395
93	Paraguay	South America	0.6487	0.7059	0.5435	0.6968
79	Republic of Moldova	Eastern Europe	0.6881	0.7529	0.5683	0.7432
130	Rwanda	Eastern Africa	0.4789	0.6176	0.2931	0.5261
193	South Sudan	Eastern Africa	0.0875	0	0.0652	0.1973
133	Tajikistan	Central Asia	0.4649	0.3176	0.3496	0.7274
158	Turkmenistan	Central Asia	0.4034	0.1765	0.3555	0.6783
137	Uganda	Eastern Africa	0.4499	0.5824	0.2278	0.5395
87	Uzbekistan	Central Asia	0.6665	0.7824	0.4736	0.7434
148	Zambia	Eastern Africa	0.4242	0.2588	0.3394	0.6745
126	Zimbabwe	Eastern Africa	0.5019	0.5235	0.3688	0.6135

Annex Table 11. E-Government Development Index EGDI of Small Island Developing States (SIDS)

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
98	Antigua and Barbuda	Caribbean	0.6055	0.4471	0.6176	0.7518
73	Bahamas	Caribbean	0.7017	0.6765	0.6739	0.7546
38	Bahrain	Melanesia	0.8213	0.7882	0.8319	0.8439
62	Barbados	Caribbean	0.7279	0.5765	0.7523	0.8549
136	Belize	Western Africa	0.4548	0.2647	0.4079	0.6919
110	Cabo Verde	South America	0.5604	0.5	0.5476	0.6337
177	Comoros	Caribbean	0.2799	0.1235	0.2511	0.4652
140	Cuba	Caribbean	0.4439	0.2588	0.2514	0.8215
99	Dominica	Micronesia	0.6013	0.4471	0.6871	0.6698
82	Dominican Republic	Southern Asia	0.6782	0.7647	0.5279	0.7419
90	Fiji	Micronesia	0.6585	0.5059	0.6468	0.8227
102	Grenada	Eastern Africa	0.5812	0.3412	0.5449	0.8576
186	Guinea-Bissau	Micronesia	0.2316	0.0647	0.2037	0.4265
129	Guyana	Micronesia	0.4909	0.4647	0.3619	0.6462
180	Haiti	Micronesia	0.2723	0.1882	0.2449	0.3839
114	Jamaica	Melanesia	0.5392	0.3882	0.5151	0.7142
145	Kiribati	Caribbean	0.432	0.4941	0.1241	0.6778
105	Maldives	Caribbean	0.574	0.4353	0.5981	0.6886
156	Marshall Islands	Caribbean	0.4055	0.3412	0.1247	0.7506
63	Mauritius	Polynesia	0.7196	0.7	0.6677	0.7911
161	Micronesia (Federated States of)	Middle Africa	0.3779	0.3529	0.1061	0.6747
154	Nauru	Eastern Africa	0.415	0.1706	0.4738	0.6006
125	Palau	South-Eastern Asia	0.5109	0.2765	0.3745	0.8816
175	Papua New Guinea	Melanesia	0.2827	0.2235	0.1233	0.5013
95	Saint Kitts and Nevis	South America	0.6352	0.3941	0.708	0.8035
112	Saint Lucia	South-Eastern Asia	0.5444	0.3824	0.5302	0.7205
109	Saint Vincent and the Grenadines	Polynesia	0.5605	0.4706	0.4894	0.7214
149	Samoa	Caribbean	0.4219	0.2647	0.2596	0.7414
155	Sao Tome and Principe	Polynesia	0.4074	0.2471	0.3015	0.6736

Annex Table 11. E-Government Development Index EGDI of Small Island Developing States (SIDS)

Rank	Country	Sub-Region	EGDI	Online Service Index	Telecommunications Infrastructure Index	Human Capital Index
76	Seychelles	Melanesia	0.692	0.6176	0.6925	0.766
11	Singapore		0.915	0.9647	0.8899	0.8904
166	Solomon Islands		0.3442	0.3235	0.2106	0.4985
122	Suriname		0.5154	0.2882	0.5482	0.7098
134	Timor-Leste		0.4649	0.4412	0.3935	0.5599
108	Tonga		0.5616	0.3765	0.48	0.8283
81	Trinidad and Tobago		0.6785	0.6118	0.6803	0.7434
151	Tuvalu		0.4209	0.3	0.2807	0.6821
142	Vanuatu		0.4403	0.3353	0.3845	0.6012

Annex Table 12. Telecommunication Infrastructure Index (TII) and its components

Country	Telecommunication Infrastructure Index (TII)	Mobile cellular telephone subscriptions per 100 inhabitants	Percentage of Individuals using the Internet	Fixed (wired) broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants
Afghanistan	0.1762	59.12	13.5	0.04	18.82
Albania	0.5785	94.18	71.85	12.56	62.79
Algeria	0.5787	111.66	49.04	7.26	81.65
Andorra	0.8372	107.28	91.57	46.31	60.44
Angola	0.1364	43.13	14.34	0.36	18.89
Antigua and Barbuda	0.6176	120	76	9.43	50.3
Argentina	0.7265	120	74.29	19.1	80.65
Armenia	0.6536	120	64.74	11.77	75.87
Australia	0.8825	113.58	86.55	30.69	120
Austria	0.824	120	87.48	28.35	87.95
Azerbaijan	0.6528	103.92	79.8	19.01	59.59
Bahamas	0.6739	98.95	85	22.58	60.85
Bahrain	0.8319	120	98.64	11.76	120
Bangladesh	0.3717	100.24	15	6.34	41.24
Barbados	0.7523	114.89	81.76	31.17	59.94
Belarus	0.8281	120	79.13	33.87	86.34
Belgium	0.8033	99.7	88.66	39.22	75.74
Belize	0.4079	85.53	47.08	6.44	38.02
Benin	0.2595	82.38	20	0.24	19.8
Bhutan	0.5367	93.26	48.11	1.43	101.64
Bolivia (Plurinational State of)	0.5184	100.82	44.29	4.44	79.87
Bosnia and Herzegovina	0.6295	104.13	70.12	20.87	55.38
Botswana	0.5591	120	47	1.78	77.6
Brazil	0.6522	98.84	70.43	14.91	88.11
Brunei Darussalam	0.8209	120	94.87	11.53	120
Bulgaria	0.7826	118.94	64.78	27	101.01
Burkina Faso	0.3117	97.91	16	0.07	29.91
Burundi	0.126	56.53	2.66	0.04	11.44
Cabo Verde	0.5476	112.24	57.16	2.88	66.83
Cambodia	0.5466	119.49	40	1.02	82.82
Cameroon	0.2299	73.19	23.2	0.07	14.03
Canada	0.7818	89.58	91	38.96	76.39
Central African Republic	0.038	27.41	4.34	0.01	5.32
Chad	0.089	45.12	6.5	0	3.96
Chile	0.7606	120	82.33	17.36	91.58
China	0.7388	115.53	54.3	28.54	93.46
Colombia	0.6122	120	64.13	13.45	52.32
Comoros	0.2511	59.94	8.48	0.18	59.95

Annex Table 12. Telecommunication Infrastructure Index (TII) and its components

Country	Telecommunication Infrastructure Index (TII)	Mobile cellular telephone subscriptions per 100 inhabitants	Percentage of Individuals using the Internet	Fixed (wired) broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants
Congo	0.2361	95.34	8.65	0.01	6.05
Costa Rica	0.7475	120	74.09	16.7	97.19
Côte d'Ivoire	0.5034	120	46.82	0.7	53.56
Croatia	0.7293	105.58	75.29	27.13	79.45
Cuba	0.2514	47.39	57.15	0.87	14.27
Cyprus	0.9057	120	84.43	36.27	111.2
Czech Republic	0.814	119.11	80.69	30.22	87.98
Democratic People's Republic of Korea	0.0127	14.98	0	0	14.98
Democratic Republic of the Congo	0.1144	43.38	8.62	0.01	15.89
Denmark	0.9979	120	97.32	44.06	120
Djibouti	0.2531	41.2	55.68	2.66	20.6
Dominica	0.6871	105.79	69.62	16.08	93.91
Dominican Republic	0.5279	84.1	74.82	7.48	60.82
Ecuador	0.5133	92.32	57.27	11.44	54.69
Egypt	0.4683	95.29	46.92	6.69	53.92
El Salvador	0.5085	120	33.82	7.67	54.53
Equatorial Guinea	0.1327	45.17	26.24	0.12	0.14
Eritrea	0	20.36	1.31	0.03	0
Estonia	0.9212	120	89.36	33.35	120
Eswatini	0.3539	93.53	47	0.71	15.91
Ethiopia	0.1194	37.22	18.62	0.06	13.9
Fiji	0.6468	117.83	49.97	1.48	120
Finland	0.9101	120	88.89	31.45	120
France	0.8719	108.36	82.04	44.78	91.62
Gabon	0.625	120	62	1.37	91.82
Gambia (Republic of The)	0.3967	120	19.84	0.19	36.76
Georgia	0.6923	120	62.72	21	73.68
Germany	0.8856	120	89.74	41.11	82.56
Ghana	0.5596	120	39	0.21	91.75
Greece	0.81	115.67	72.95	37.65	81.38
Grenada	0.5449	102.08	59.07	20.05	32.92
Guatemala	0.4828	118.67	65	3.14	16.45
Guinea	0.3008	96.77	18	0.01	23.83
Guinea-Bissau	0.2037	78.99	3.93	0.06	17.72
Guyana	0.3619	82.97	37.33	8.37	26.38
Haiti	0.2449	57.53	32.47	0.28	29.98
Honduras	0.3244	79.15	31.7	3.7	32.12
Hungary	0.7255	103.45	76.07	31.72	67.81

Annex Table 12. Telecommunication Infrastructure Index (TII) and its components

Country	Telecommunication Infrastructure Index (TII)	Mobile cellular telephone subscriptions per 100 inhabitants	Percentage of Individuals using the Internet	Fixed (wired) broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants
Iceland	0.9838	120	99.01	40.56	120
India	0.3515	86.94	34.45	1.34	37.5
Indonesia	0.5669	119.34	39.9	3.32	87.15
Iran (Islamic Republic of)	0.621	108.46	70	11.99	68.21
Iraq	0.537	95.04	75	11.69	39.83
Ireland	0.81	103.17	84.52	29.68	103.75
Israel	0.8689	120	83.73	28.75	113.34
Italy	0.7932	120	74.39	28.14	89.89
Jamaica	0.5151	101.03	55.07	9.7	51.19
Japan	0.9223	120	91.28	32.62	120
Jordan	0.554	87.62	66.79	4.01	87.62
Kazakhstan	0.7024	120	78.9	13.44	77.57
Kenya	0.3402	96.32	17.83	0.72	41.92
Kiribati	0.1241	50.79	14.58	0.76	1.46
Kuwait	0.7858	120	99.6	2.51	120
Kyrgyzstan	0.5902	120	38	5.64	94.03
Lao People's Democratic Republic	0.2383	51.86	25.51	0.64	42.01
Latvia	0.8399	107.35	83.58	27.28	120
Lebanon	0.4123	64.5	78.18	0.14	45.25
Lesotho	0.4497	113.83	29	0.27	58.98
Liberia	0.1411	56.57	7.98	0.19	11.7
Libya	0.3459	91.48	21.76	4.83	35.76
Liechtenstein	1	120	98.1	44.08	120
Lithuania	0.8249	120	79.72	28.16	98.55
Luxembourg	0.9072	120	97.06	37.12	94
Madagascar	0.1096	40.57	9.8	0.1	15.6
Malawi	0.1394	39.01	13.78	0.06	27.21
Malaysia	0.7634	120	81.2	8.55	116.7
Maldives	0.5981	120	63.19	10.37	54.47
Mali	0.3546	115.08	13	0.63	30.28
Malta	0.9232	120	81.66	43.67	104.34
Marshall Islands	0.1247	27.56	38.7	1.72	0
Mauritania	0.3886	103.71	20.8	0.3	52.94
Mauritius	0.6677	120	58.6	21.64	65.29
Mexico	0.591	95.23	65.77	14.55	69.97
Micronesia (Federated States of)	0.1061	20.74	35.3	3.39	0
Monaco	0.8639	84.51	97.05	51.24	84.15
Mongolia	0.6135	120	47.16	9.66	83.72

Annex Table 12. Telecommunication Infrastructure Index (TII) and its components

Country	Telecommunication Infrastructure Index (TII)	Mobile cellular telephone subscriptions per 100 inhabitants	Percentage of Individuals using the Internet	Fixed (wired) broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants
Montenegro	0.7366	120	71.52	25.33	73.16
Morocco	0.58	120	64.8	4.31	59.09
Mozambique	0.1293	47.72	10	0.24	15.07
Myanmar	0.5234	113.84	30.68	0.24	92.69
Namibia	0.5447	112.7	51	2.53	73.38
Nauru	0.4738	94.58	57	9.5	37.83
Nepal	0.4691	120	34	2.82	47.52
Netherlands	0.9276	120	94.71	43.42	90.85
New Zealand	0.9207	120	90.81	34.72	114.46
Nicaragua	0.3812	115.1	27.86	2.98	18.67
Niger	0.0737	40.64	5.25	0.04	3.93
Nigeria	0.3534	88.18	42	0.04	30.68
North Macedonia	0.6442	94.53	79.17	20.55	64.72
Norway	0.9034	107.17	96.49	41.34	99.18
Oman	0.6967	120	80.19	8.74	85.17
Pakistan	0.2437	72.56	15.51	0.85	29.19
Palau	0.3745	120	26.97	6.93	0
Panama	0.6488	120	57.87	12.93	79.15
Papua New Guinea	0.1233	47.62	11.21	0.21	10.87
Paraguay	0.5435	106.95	64.99	4.61	57.67
Peru	0.578	120	52.54	7.35	65.66
Philippines	0.5838	120	60.05	3.68	68.44
Poland	0.8005	120	77.54	16.13	120
Portugal	0.7948	115.63	74.66	36.9	73.84
Qatar	0.8233	120	99.65	9.63	120
Republic of Korea	0.9684	120	96.02	41.6	113.62
Republic of Moldova	0.5683	88.01	76.12	15.38	53.51
Romania	0.7586	116.25	70.68	26.06	87.97
Russian Federation	0.7723	120	80.86	22	87.28
Rwanda	0.2931	78.85	21.77	0.06	39.01
Saint Kitts and Nevis	0.708	120	80.71	16.65	69.92
Saint Lucia	0.5302	101.68	50.82	17.74	42.51
Saint Vincent and the Grenadines	0.4894	96.07	22.39	22.33	53.95
Samoa	0.2596	63.58	33.61	0.87	26.16
San Marino	0.8153	112.86	60.18	31.18	120
Sao Tome and Principe	0.3015	77.06	29.93	0.74	33.54
Saudi Arabia	0.8442	120	93.31	20.24	111.09
Senegal	0.4358	104.45	46	0.82	42.12
Serbia	0.62	95.78	73.36	17.63	66.02
Seychelles	0.6925	120	58.77	20.29	80.52

Annex Table 12. Telecommunication Infrastructure Index (TII) and its components

Country	Telecommunication Infrastructure Index (TII)	Mobile cellular telephone subscriptions per 100 inhabitants	Percentage of Individuals using the Internet	Fixed (wired) broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants
Sierra Leone	0.259	88.47	9	0	25.83
Singapore	0.8899	120	88.17	27.97	120
Slovakia	0.7988	120	80.66	27.65	85.98
Slovenia	0.7853	118.67	79.75	29.49	77.67
Solomon Islands	0.2106	73.83	11.92	0.23	17.5
Somalia	0.0939	50.99	2	0.67	2.45
South Africa	0.5832	120	56.17	1.92	77.49
South Sudan	0.0652	33.46	7.98	0	6
Spain	0.8531	115.99	86.11	32.5	98.48
Sri Lanka	0.5289	120	34.11	7.27	65.04
Sudan	0.2844	72.01	30.87	0.08	32.43
Suriname	0.5482	120	48.95	12.7	42.09
Sweden	0.9625	120	92.14	39.85	120
Switzerland	0.9482	120	89.69	46.42	99.44
Syrian Arab Republic	0.3804	101.09	34.25	7.84	16.5
Tajikistan	0.3496	111.53	21.96	0.07	22.83
Thailand	0.7004	120	56.82	13.24	104.67
Timor-Leste	0.3935	115.81	27.49	0.05	31.61
Togo	0.2532	77.89	12.36	0.33	32
Tonga	0.48	104.59	41.25	2.44	65.14
Trinidad and Tobago	0.6803	120	77.33	24.54	40.68
Tunisia	0.6369	120	64.19	8.77	76.08
Turkey	0.628	97.3	71.04	16.28	74.2
Turkmenistan	0.3555	120	21.25	0.09	15.3
Tuvalu	0.2807	70.36	49.32	3.96	0
Uganda	0.2278	57.27	23.71	0.02	33.61
Ukraine	0.5942	120	62.55	12.8	47.16
United Arab Emirates	0.9344	120	98.45	31.4	120
United Kingdom of Great Britain and Northern Ireland	0.9195	118.37	94.9	39.6	98.54
United Republic of Tanzania	0.243	77.24	25	1.53	9.1
United States of America	0.9182	120	87.27	33.8	120
Uruguay	0.8574	120	74.77	28.34	120
Uzbekistan	0.4736	71.52	55.2	12.7	62.36
Vanuatu	0.3845	85.91	25.72	1.61	65.07
Venezuela, Bolivarian Republic of	0.482	71.77	72	9.02	54.53
Viet Nam	0.6694	120	70.35	13.6	71.89

Annex Table 12. Telecommunication Infrastructure Index (TII) and its components

Country	Telecommunication Infrastructure Index (TII)	Mobile cellular telephone subscriptions per 100 inhabitants	Percentage of Individuals using the Internet	Fixed (wired) broadband subscriptions per 100 inhabitants	Active mobile-broadband subscriptions per 100 inhabitants
Yemen	0.1757	53.68	26.72	1.36	5.99
Zambia	0.3394	89.16	14.3	0.25	56.63
Zimbabwe	0.3688	89.4	27.06	1.41	51.67

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Afghanistan	0.3728	43.02	2018	UNESCO	65.27	2014	UNESCO	10.1	2018	UNDP (HDI)	3.9	2018	UNDP (HDI)
Albania	0.8001	98.14	2018	UNESCO	83.89	2018	UNESCO	14.7	2018	UNESCO	10.1	2018	UNDP (HDI)
Algeria	0.6966	81.41	2018	UNESCO	80.97	2011	UNESCO	14.7	2018	UNDP (HDI)	8	2018	UNDP (HDI)
Andorra	0.7448	100	2016	UNESCO	69	2014	UNESCO	13.3	2018	UNDP (HDI)	10.2	2018	UNDP (HDI)
Angola	0.5295	71.1	2015	UNDP (HDI)	67.1	2011	UNESCO	11.8	2018	UNDP (HDI)	5.1	2018	UNDP (HDI)
Antigua and Barbuda	0.7518	98.95	2015	UNESCO	82.03	2012	UNESCO	12.5	2018	UNDP (HDI)	9.3	2018	UNDP (HDI)
Argentina	0.91	99	2018	UNESCO	100	2017	UNESCO	17.6	2018	UNDP (HDI)	11.16	2018	UNESCO
Armenia	0.7872	99.74	2017	UNESCO	77.17	2018	UNESCO	13.07	2018	UNESCO	11.8	2018	UNDP (HDI)
Australia	1	99	2014	UNESCO	100	2017	UNESCO	22.1	2018	UNDP (HDI)	12.51	2018	UNESCO
Austria	0.9032	99	2014	UNESCO	97.15	2017	UNESCO	16.3	2018	UNDP (HDI)	12.6	2018	UNDP (HDI)
Azerbaijan	0.7713	99.79	2017	UNESCO	77	2018	UNESCO	13.31	2018	UNESCO	10.5	2018	UNDP (HDI)
Bahamas	0.7546	95.8	2014	UNESCO	74	2014	UNESCO	12.8	2018	UNDP (HDI)	11.5	2018	UNDP (HDI)
Bahrain	0.8439	97.46	2018	UNESCO	89.71	2018	UNESCO	16.25	2018	UNESCO	10.48	2018	UNESCO
Bangladesh	0.5731	73.91	2018	UNESCO	70.46	2018	UNESCO	12.03	2018	UNESCO	6.42	2018	UNESCO
Barbados	0.8549	99.7	2014	UNESCO	95.74	2011	UNESCO	15.2	2018	UNDP (HDI)	10.6	2018	UNDP (HDI)
Belarus	0.8912	99.76	2018	UNESCO	98.38	2018	UNESCO	15.4	2018	UNESCO	12.3	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Belgium	0.9521	99	2014	UNESCO	100	2017	UNESCO	19.7	2018	UNDP (HDI)	11.8	2018	UNDP (HDI)
Belize	0.6919	82.7	2015	UNDP (HDI)	76.85	2017	UNESCO	13.1	2018	UNDP (HDI)	9.8	2018	UNDP (HDI)
Benin	0.4404	42.36	2018	UNESCO	76.82	2016	UNESCO	12.6	2018	UNDP (HDI)	3.8	2018	UNDP (HDI)
Bhutan	0.5139	66.56	2017	UNESCO	71.11	2018	UNESCO	13.1	2018	UNESCO	3.1	2018	UNDP (HDI)
Bolivia (Plurinational State of)	0.7379	92.46	2015	UNESCO	79.25	2007	UNESCO	14	2018	UNDP (HDI)	9	2018	UNDP (HDI)
Bosnia and Herzegovina	0.7468	98.5	2015	UNDP (HDI)	71	2014	UNESCO	13.8	2018	UNDP (HDI)	9.82	2018	UNESCO
Botswana	0.6911	88.5	2015	UNDP (HDI)	73.58	2008	UNESCO	12.7	2018	UNDP (HDI)	9.3	2018	UNDP (HDI)
Brazil	0.7803	93.23	2018	UNESCO	90.85	2017	UNESCO	15.4	2018	UNDP (HDI)	7.98	2018	UNESCO
Brunei Darussalam	0.7605	97.21	2018	UNESCO	78.57	2018	UNESCO	14.31	2018	UNESCO	9.1	2018	UNDP (HDI)
Bulgaria	0.8408	98.4	2015	UNDP (HDI)	88.39	2016	UNESCO	14.8	2018	UNDP (HDI)	11.8	2018	UNDP (HDI)
Burkina Faso	0.2911	41.22	2018	UNESCO	55.52	2018	UNESCO	9.27	2018	UNESCO	1.6	2018	UNDP (HDI)
Burundi	0.4891	68.38	2017	UNESCO	69.8	2017	UNESCO	11.3	2018	UNDP (HDI)	3.1	2018	UNDP (HDI)
Cabo Verde	0.6337	86.79	2015	UNESCO	76.38	2017	UNESCO	11.9	2018	UNDP (HDI)	6.2	2018	UNDP (HDI)
Cambodia	0.5344	80.53	2015	UNESCO	60.44	2015	UNESCO	11.3	2018	UNDP (HDI)	4.8	2018	UNDP (HDI)
Cameroon	0.5971	77.07	2018	UNESCO	71.64	2016	UNESCO	12.7	2018	UNDP (HDI)	6.3	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Canada	0.9029	99	2014	UNESCO	94.46	2017	UNESCO	16.1	2018	UNDP (HDI)	13.3	2018	UNDP (HDI)
Central African Republic	0.2539	37.4	2018	UNESCO	42.49	2013	UNESCO	7.6	2018	UNDP (HDI)	4.3	2018	UNDP (HDI)
Chad	0.1782	22.31	2016	UNESCO	46.66	2015	UNESCO	7.5	2018	UNDP (HDI)	2.4	2018	UNDP (HDI)
Chile	0.8643	96.4	2017	UNESCO	97.43	2017	UNESCO	16.5	2018	UNDP (HDI)	10.4	2018	UNDP (HDI)
China	0.7396	96.84	2018	UNESCO	80.27	2018	UNESCO	13.9	2018	UNDP (HDI)	7.9	2018	UNDP(HDI)
Colombia	0.7723	95.09	2018	UNESCO	88.44	2018	UNESCO	14.4	2018	UNESCO	8.47	2018	UNESCO
Comoros	0.4652	58.82	2018	UNESCO	65.29	2014	UNESCO	11.2	2018	UNDP (HDI)	4.9	2018	UNDP (HDI)
Congo	0.5822	80.3	2018	UNESCO	67.02	2012	UNESCO	11.6	2018	UNDP (HDI)	6.5	2018	UNDP (HDI)
Costa Rica	0.8428	97.86	2018	UNESCO	99.89	2018	UNESCO	15.9	2018	UNESCO	8.74	2018	UNESCO
Côte d'Ivoire	0.3808	47.17	2018	UNESCO	58.38	2017	UNESCO	9.6	2018	UNDP (HDI)	5.2	2018	UNDP (HDI)
Croatia	0.8414	99.3	2015	UNDP (HDI)	88.39	2016	UNESCO	15	2018	UNDP (HDI)	11.4	2018	UNDP (HDI)
Cuba	0.8215	99.7	2015	UNDP (HDI)	82	2017	UNESCO	14.4	2018	UNDP (HDI)	11.8	2018	UNDP (HDI)
Cyprus	0.8429	99.1	2015	UNDP (HDI)	85.67	2015	UNESCO	14.7	2018	UNDP (HDI)	12.38	2018	UNESCO
Czech Republic	0.903	99	2014	UNESCO	93.82	2017	UNESCO	16.8	2018	UNDP (HDI)	12.7	2018	UNDP (HDI)
Democratic People's Republic of Korea	0.6402	100	2015	UNDP (HDI)	70.75	2015	UNESCO	10.8	2018	UNDP (HDI)	5.47	2017	estimation

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Democratic Republic of the Congo	0.5303	77.04	2016	UNESCO	61.9	2013	UNESCO	9.7	2018	UNDP (HDI)	6.8	2018	UNDP (HDI)
Denmark	0.9588	99	2014	UNESCO	100	2017	UNESCO	19.1	2018	UNDP (HDI)	12.87	2018	UNESCO
Djibouti	0.3418	70.3	2014	UNESCO	36.81	2011	UNESCO	6.5	2018	UNDP (HDI)	4	2018	UNDP (HDI)
Dominica	0.6698	88	2014	UNESCO	73	2014	UNESCO	13	2018	UNDP (HDI)	7.8	2018	UNDP (HDI)
Dominican Republic	0.7419	93.78	2016	UNESCO	84.11	2017	UNESCO	14.1	2018	UNDP (HDI)	7.9	2018	UNDP (HDI)
Ecuador	0.7793	92.83	2017	UNESCO	88.39	2015	UNESCO	14.9	2018	UNDP (HDI)	9	2018	UNDP (HDI)
Egypt	0.6192	71.17	2017	UNESCO	79.9	2017	UNESCO	13.1	2018	UNDP (HDI)	7.3	2018	UNDP (HDI)
El Salvador	0.6242	88.48	2017	UNESCO	66.49	2017	UNESCO	12	2018	UNDP (HDI)	6.9	2018	UNDP (HDI)
Equatorial Guinea	0.5547	95.3	2015	UNDP (HDI)	55	2014	UNESCO	9.2	2018	UNDP (HDI)	5.6	2018	UNDP (HDI)
Eritrea	0.3759	76.57	2018	UNESCO	49.14	2015	UNESCO	5	2018	UNDP (HDI)	3.9	2018	UNDP (HDI)
Estonia	0.9266	99.8	2015	UNDP (HDI)	97.8	2017	UNESCO	16.1	2018	UNDP (HDI)	14.05	2018	UNESCO
Eswatini	0.6392	88.42	2018	UNESCO	76.22	2013	UNESCO	11.4	2018	UNDP (HDI)	6.7	2018	UNDP (HDI)
Ethiopia	0.3378	51.77	2017	UNESCO	54.59	2012	UNESCO	8.7	2018	UNDP (HDI)	2.8	2018	UNDP (HDI)
Fiji	0.8227	99.08	2017	UNESCO	88		UNDP	14.4	2018	UNDP (HDI)	10.9	2018	UNDP (HDI)
Finland	0.9549	99	2014	UNESCO	100	2017	UNESCO	19.3	2018	UNDP (HDI)	12.4	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
France	0.8612	99	2014	UNESCO	93.05	2017	UNESCO	15.5	2018	UNDP (HDI)	11.4	2018	UNDP (HDI)
Gabon	0.6719	84.67	2018	UNESCO	76.15	2001	UNESCO	12.9	2018	UNDP (HDI)	8.3	2018	UNDP (HDI)
Gambia (Republic of The)	0.363	50.78	2015	UNESCO	55.7	2010	UNESCO	9.5	2018	UNDP (HDI)	3.7	2018	UNDP (HDI)
Georgia	0.8717	99.36	2017	UNESCO	90.09	2018	UNESCO	15.28	2018	UNESCO	12.8	2018	UNDP (HDI)
Germany	0.9362	99	2014	UNESCO	96.22	2017	UNESCO	17.1	2018	UNDP (HDI)	14.15	2018	UNESCO
Ghana	0.593	79.04	2018	UNESCO	69.45	2018	UNESCO	11.48	2018	UNESCO	7.2	2018	UNDP (HDI)
Greece	0.8905	97.7	2015	UNDP (HDI)	100	2017	UNESCO	17.3	2018	UNDP (HDI)	10.5	2018	UNDP (HDI)
Grenada	0.8576	98.6	2014	UNESCO	100	2017	UNESCO	16.6	2018	UNDP (HDI)	8.8	2018	UNDP (HDI)
Guatemala	0.552	79.3	2015	UNDP (HDI)	63.18	2015	UNESCO	10.6	2018	UNDP (HDI)	6.5	2018	UNDP (HDI)
Guinea	0.2591	30.4	2015	UNDP (HDI)	54.49	2014	UNESCO	9	2018	UNDP (HDI)	2.7	2018	UNDP (HDI)
Guinea-Bissau	0.4265	59.9	2015	UNDP (HDI)	62.46	2006	UNESCO	10.5	2018	UNDP (HDI)	3.3	2018	UNDP (HDI)
Guyana	0.6462	88.5	2015	UNDP (HDI)	68.54	2012	UNESCO	11.5	2018	UNDP (HDI)	8.5	2018	UNDP (HDI)
Haiti	0.3839	61.69	2016	UNESCO	39.4	2014	UNESCO	9.5	2018	UNDP (HDI)	5.4	2018	UNDP (HDI)
Honduras	0.5568	87.21	2018	UNESCO	57.44	2015	UNESCO	10.2	2018	UNDP (HDI)	6.31	2018	UNESCO
Hungary	0.8509	99	2015	UNDP (HDI)	88.96	2017	UNESCO	15.1	2018	UNDP (HDI)	11.9	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Iceland	0.9525	99	2014	UNESCO	99.18	2017	UNESCO	19.2	2018	UNDP (HDI)	12.5	2018	UNDP (HDI)
India	0.5848	74.37	2018	UNESCO	72.08	2017	UNESCO	12.3	2018	UNDP (HDI)	6.5	2018	UNDP (HDI)
Indonesia	0.7342	95.66	2018	UNESCO	80.16	2018	UNESCO	13.61	2018	UNESCO	8.17	2018	UNESCO
Iran (Islamic Republic of)	0.7686	85.54	2016	UNESCO	90.25	2016	UNESCO	14.7	2018	UNDP (HDI)	10	2018	UNDP (HDI)
Iraq	0.4358	50.14	2018	UNESCO	54.48	2000	UNESCO	11.1	2018	UNDP (HDI)	7.3	2018	UNDP (HDI)
Ireland	0.9494	99.2	2015	UNDP (HDI)	100	2017	UNESCO	18.8	2018	UNDP (HDI)	12.5	2018	UNDP (HDI)
Israel	0.8924	97.76	2011	UNESCO	94.54	2017	UNESCO	16	2018	UNDP (HDI)	13	2018	UNDP (HDI)
Italy	0.8466	99.16	2018	UNESCO	90.17	2017	UNESCO	16.2	2018	UNDP (HDI)	10.2	2018	UNDP (HDI)
Jamaica	0.7142	88.7	2015	UNDP (HDI)	76.66	2015	UNESCO	13.1	2018	UNDP (HDI)	9.8	2018	UNDP (HDI)
Japan	0.8684	99	2014	UNESCO	89.84	2014	UNESCO	15.2	2018	UNDP (HDI)	12.8	2018	UNDP (HDI)
Jordan	0.68	98.23	2018	UNESCO	62.77	2018	UNESCO	10.42	2018	UNESCO	10.5	2018	UNDP (HDI)
Kazakhstan	0.8866	99.8	2015	UNDP (HDI)	99.15	2018	UNESCO	15.44	2018	UNESCO	11.8	2018	UNDP (HDI)
Kenya	0.5812	81.53	2018	UNESCO	67.22	2009	UNESCO	11.1	2018	UNDP (HDI)	6.6	2018	UNDP (HDI)
Kiribati	0.6778	93	2014	UN E-GOV Survey	75.14	2008	UNESCO	11.8	2018	UNDP (HDI)	7.9	2018	UNDP (HDI)
Kuwait	0.747	96.06	2018	UNESCO	88.11	2015	UNESCO	13.8	2018	UNDP (HDI)	7.21	2018	UNESCO

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Kyrgyzstan	0.7873	99.59	2018	UNESCO	82.72	2018	UNESCO	12.97	2018	UNESCO	10.9	2018	UNDP (HDI)
Lao People's Democratic Republic	0.5539	84.66	2015	UNESCO	63.32	2018	UNESCO	10.63	2018	UNESCO	5.2	2018	UNDP (HDI)
Latvia	0.9172	99.9	2015	UNDP (HDI)	100	2017	UNESCO	16	2018	UNDP (HDI)	13.08	2018	UNESCO
Lebanon	0.6567	95.07	2018	UNESCO	63.43	2015	UNESCO	11.3	2018	UNDP (HDI)	8.7	2018	UNDP (HDI)
Lesotho	0.5753	79.4	2015	UNDP (HDI)	71.78	2017	UNESCO	10.7	2018	UNDP (HDI)	6.3	2018	UNDP (HDI)
Liberia	0.3933	48.3	2017	UNESCO	63.92	2000	UNESCO	9.6	2018	UNDP (HDI)	4.7	2018	UNDP (HDI)
Libya	0.7357	91	2015	UNDP (HDI)	94.38	2003	UNESCO	12.8	2018	UNDP (HDI)	7.6	2018	UNDP (HDI)
Liechtenstein	0.8489	99	2014	UN E-GOV Survey	87.29	2016	UNESCO	14.7	2018	UNDP (HDI)	12.5	2018	UNDP (HDI)
Lithuania	0.9218	99.8	2015	UNDP (HDI)	99.43	2017	UNESCO	16.5	2018	UNDP (HDI)	13	2018	UNDP (HDI)
Luxembourg	0.8097	99	2014	UNESCO	77.79	2017	UNESCO	14.2	2018	UNDP (HDI)	12.2	2018	UNDP (HDI)
Madagascar	0.5307	74.8	2018	UNESCO	64.94	2016	UNESCO	10.4	2018	UNDP (HDI)	6.1	2018	UNDP (HDI)
Malawi	0.4812	62.14	2015	UNESCO	69.12	2011	UNESCO	11	2018	UNDP (HDI)	4.6	2018	UNDP (HDI)
Malaysia	0.7513	93.73	2016	UNESCO	78.66	2017	UNESCO	13.5	2018	UNDP (HDI)	10.2	2018	UNDP (HDI)
Maldives	0.6886	97.73	2016	UNESCO	76.76	2003	UNESCO	12.1	2018	UNDP (HDI)	6.8	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Mali	0.2274	35.47	2018	UNESCO	48.53	2015	UNESCO	7.6	2018	UNDP (HDI)	1.87	2018	UNESCO
Malta	0.829	94.5	2018	UNESCO	86.06	2016	UNESCO	15.9	2018	UNDP (HDI)	11.3	2018	UNDP (HDI)
Marshall Islands	0.7506	98.27	2011	UNESCO	74.62	2002	UNESCO	12.4	2018	UNDP (HDI)	10.9	2018	UNDP (HDI)
Mauritania	0.3575	53.5	2017	UNESCO	50.85	2017	UNESCO	8.5	2018	UNDP (HDI)	4.6	2018	UNDP (HDI)
Mauritius	0.7911	91.33	2018	UNESCO	82.43	2017	UNESCO	15	2018	UNDP (HDI)	11.2	2018	UNESCO
Mexico	0.7727	95.38	2018	UNESCO	86.22	2017	UNESCO	14.3	2018	UNDP (HDI)	8.95	2018	UNESCO
Micronesia (Federated States of)	0.6747	94	2014	UNESCO	75.43	2004	UNESCO	11.5	2018	UNDP (HDI)	7.7	2018	UNDP (HDI)
Monaco	0.8187	99	2014	UN E-GOV Survey	99	2014	UNDP	11.8	2015	UNDP (HDI)	11.27	2017	estimation
Mongolia	0.8063	98.42	2018	UNESCO	87.9	2015	UNESCO	14.2	2018	UNDP (HDI)	10.2	2018	UNDP (HDI)
Montenegro	0.8239	98.85	2018	UNESCO	82.82	2017	UNESCO	15	2018	UNDP (HDI)	11.4	2018	UNDP (HDI)
Morocco	0.6152	73.75	2018	UNESCO	81.12	2018	UNESCO	13.72	2018	UNESCO	5.5	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Mozambique	0.4222	60.66	2017	UNESCO	63.25	2017	UNESCO	9.7	2018	UNDP (HDI)	3.5	2018	UNDP (HDI)
Myanmar	0.5125	75.55	2016	UNESCO	63.84	2017	UNESCO	10.3	2018	UNDP (HDI)	5	2018	UNDP (HDI)
Namibia	0.6558	91.53	2018	UNESCO	70.28	2006	UNESCO	12.6	2018	UNDP (HDI)	6.9	2018	UNDP (HDI)
Nauru	0.6006	92	2014	UN E-GOV Survey	56.13	2008	UNESCO	11.3	2018	UNDP (HDI)	7.12	2017	estimation
Nepal	0.5405	67.91	2018	UNESCO	74.13	2017	UNESCO	12.2	2018	UNDP (HDI)	4.9	2018	UNDP (HDI)
Netherlands	0.9349	99	2014	UNESCO	100	2017	UNESCO	18	2018	UNDP (HDI)	12.41	2018	UNESCO
New Zealand	0.9516	99	2014	UNESCO	100	2017	UNESCO	18.8	2018	UNDP (HDI)	12.7	2018	UNDP (HDI)
Nicaragua	0.6133	82.61	2015	UNESCO	70	2014	UNESCO	12.2	2018	UNDP (HDI)	6.8	2018	UNDP (HDI)
Niger	0.1304	19.1	2015	UNDP (HDI)	41.71	2017	UNESCO	6.5	2018	UNDP (HDI)	2	2018	UNDP (HDI)
Nigeria	0.4507	62.02	2018	UNESCO	55.64	2011	UNESCO	9.7	2018	UNDP (HDI)	6.5	2018	UNDP (HDI)
North Macedonia	0.7395	97.8	2015	UNDP (HDI)	71.65	2015	UNESCO	13.5	2018	UNDP (HDI)	9.7	2018	UNDP (HDI)
Norway	0.9392	99	2014	UNESCO	100	2017	UNESCO	18.1	2018	UNDP (HDI)	12.6	2018	UNDP (HDI)
Oman	0.7751	95.65	2018	UNESCO	83.73	2018	UNESCO	14.12	2018	UNESCO	9.7	2018	UNDP (HDI)
Pakistan	0.3818	59.13	2017	UNESCO	49.88	2018	UNESCO	8.28	2018	UNESCO	5.2	2018	UNDP (HDI)
Palau	0.8816	96.59	2015	UNESCO	97.67	2013	UNESCO	15.6	2018	UNDP (HDI)	12.4	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Panama	0.7421	95.41	2018	UNESCO	76.43	2016	UNESCO	12.9	2018	UNDP (HDI)	10.2	2018	UNDP (HDI)
Papua New Guinea	0.5013	64.2	2015	UNDP (HDI)	78.93	2012	UNESCO	10	2018	UNDP (HDI)	4.6	2018	UNDP (HDI)
Paraguay	0.6968	94.02	2018	UNESCO	71.59	2010	UNESCO	12.7	2018	UNDP (HDI)	8.65	2018	UNESCO
Peru	0.794	94.41	2018	UNESCO	93.84	2017	UNESCO	13.8	2018	UNDP (HDI)	9.7	2018	UNESCO
Philippines	0.7544	98.18	2015	UNESCO	82.35	2017	UNESCO	12.7	2018	UNDP (HDI)	9.4	2018	UNDP (HDI)
Poland	0.9001	99.8	2015	UNDP (HDI)	96.02	2017	UNESCO	16.4	2018	UNDP (HDI)	12.3	2018	UNDP (HDI)
Portugal	0.8463	96.14	2018	UNESCO	98.52	2017	UNESCO	16.3	2018	UNDP (HDI)	9.26	2018	UNESCO
Qatar	0.6698	93.46	2017	UNESCO	60.02	2015	UNESCO	12.2	2018	UNDP (HDI)	9.7	2018	UNDP (HDI)
Republic of Korea	0.8997	99	2014	UNESCO	97.48	2017	UNESCO	16.4	2018	UNDP (HDI)	12.2	2018	UNDP (HDI)
Republic of Moldova	0.7432	99.4	2015	UNDP (HDI)	71.56	2018	UNESCO	11.53	2018	UNESCO	11.6	2018	UNDP (HDI)
Romania	0.7995	98.84	2018	UNESCO	80.18	2016	UNESCO	14.3	2018	UNDP (HDI)	11	2018	UNDP (HDI)
Russian Federation	0.8833	99.73	2018	UNESCO	96.71	2017	UNESCO	15.5	2018	UNDP (HDI)	12	2018	UNDP (HDI)
Rwanda	0.5261	73.22	2018	UNESCO	70.41	2018	UNESCO	11.19	2018	UNESCO	4.34	2018	UNESCO
Saint Kitts and Nevis	0.8035	97.8	2014	UNESCO	100	2015	UNESCO	13.6	2018	UNDP (HDI)	8.5	2018	UNDP (HDI)
Saint Lucia	0.7205	94.8	2014	UNESCO	72.57	2018	UNESCO	14	2018	UNESCO	8.5	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Saint Vincent and the Grenadines	0.7214	88.1	2014	UNESCO	83.56	2015	UNESCO	13.6	2018	UNDP (HDI)	8.6	2018	UNDP (HDI)
Samoa	0.7414	99.1	2018	UNESCO	71.32	2000	UNESCO	12.5	2018	UNDP (HDI)	10.6	2018	UNDP (HDI)
San Marino	0.7549	99.92	2018	UNESCO	71.17	2018	UNESCO	13.05	2018	UNESCO	10.75	2018	UNESCO
Sao Tome and Principe	0.6736	92.82	2018	UNESCO	76.9	2015	UNESCO	12.7	2018	UNDP (HDI)	6.4	2018	UNDP (HDI)
Saudi Arabia	0.8648	95.33	2017	UNESCO	100	2014	UNESCO	17	2018	UNDP (HDI)	9.7	2018	UNDP (HDI)
Senegal	0.3332	51.9	2017	UNESCO	51.87	2018	UNESCO	8.58	2018	UNESCO	3.1	2018	UNDP (HDI)
Serbia	0.828	98.29	2018	UNESCO	87.54	2018	UNESCO	14.74	2018	UNESCO	11.2	2018	UNDP (HDI)
Seychelles	0.766	95.87	2018	UNESCO	80.03	2018	UNESCO	14.15	2018	UNESCO	9.7	2018	UNDP (HDI)
Sierra Leone	0.3144	43.21	2018	UNESCO	45.43	2001	UNESCO	10.2	2018	UNDP (HDI)	3.6	2018	UNDP (HDI)
Singapore	0.8904	97.34	2018	UNESCO	100	2017	UNESCO	16.3	2018	UNDP (HDI)	11.62	2018	UNESCO
Slovakia	0.8286	99.6	2015	UNDP (HDI)	79.89	2017	UNESCO	14.5	2018	UNDP (HDI)	12.6	2018	UNDP (HDI)
Slovenia	0.9256	99.7	2015	UNDP (HDI)	99.65	2017	UNESCO	17.4	2018	UNDP (HDI)	12.3	2018	UNDP (HDI)
Solomon Islands	0.4985	76.6	1999	UNESCO	55.42	2007	UNESCO	10.2	2018	UNDP (HDI)	5.5	2018	UNDP (HDI)
Somalia	0	24	2014	UN E-Gov Survey	17	2014	UNDP	2.4	2013	UNDP (HDI)	0.97	2017	estimation
South Africa	0.7371	87.05	2017	UNESCO	81.54	2017	UNESCO	13.7	2018	UNDP (HDI)	10.2	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
South Sudan	0.1973	34.52	2018	UNESCO	38	2014	UNESCO	5	2018	UNDP (HDI)	4.8	2018	UNDP (HDI)
Spain	0.8989	98.44	2018	UNESCO	100	2017	UNESCO	17.9	2018	UNDP (HDI)	10.25	2018	UNESCO
Sri Lanka	0.766	91.9	2017	UNESCO	78.81	2017	UNESCO	14	2018	UNDP (HDI)	11.1	2018	UNDP (HDI)
Sudan	0.3559	60.7	2018	UNESCO	49.69	2015	UNESCO	7.7	2018	UNDP (HDI)	3.7	2018	UNDP (HDI)
Suriname	0.7098	94.38	2018	UNESCO	72.21	2002	UNESCO	12.9	2018	UNDP (HDI)	9.1	2018	UNDP (HDI)
Sweden	0.9471	99	2014	UNESCO	100	2017	UNESCO	18.8	2018	UNDP (HDI)	12.4	2018	UNDP (HDI)
Switzerland	0.8946	99	2014	UNESCO	90.44	2017	UNESCO	16.2	2018	UNDP (HDI)	13.4	2018	UNDP (HDI)
Syrian Arab Republic	0.5073	86.4	2015	UNDP (HDI)	55.11	2013	UNESCO	8.8	2018	UNDP (HDI)	5.1	2018	UNDP (HDI)
Tajikistan	0.7274	99.8	2015	UNDP (HDI)	70.93	2013	UNESCO	11.4	2018	UNDP (HDI)	10.7	2018	UNDP (HDI)
Thailand	0.7751	92.87	2015	UNESCO	90.87	2016	UNESCO	14.7	2018	UNDP (HDI)	8.45	2018	UNESCO
Timor-Leste	0.5599	68.07	2018	UNESCO	81.79	2010	UNESCO	12.4	2018	UNDP (HDI)	4.5	2018	UNDP (HDI)
Togo	0.5373	63.75	2015	UNESCO	75.89	2017	UNESCO	12.6	2018	UNDP (HDI)	5	2018	UNDP (HDI)
Tonga	0.8283	99.41	2018	UNESCO	88.5	2003	UNESCO	14.3	2018	UNDP (HDI)	11.2	2018	UNDP (HDI)
Trinidad and Tobago	0.7434	99	2015	UNDP (HDI)	67.31	2004	UNESCO	13	2018	UNDP (HDI)	11	2018	UNDP (HDI)
Tunisia	0.6974	81.8	2015	UNDP (HDI)	82.74	2016	UNESCO	15.1	2018	UNDP (HDI)	7.2	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Turkey	0.8287	96.15	2017	UNESCO	100	2017	UNESCO	16.4	2018	UNDP (HDI)	7.7	2018	UNDP (HDI)
Turkmenistan	0.6783	99.7	2015	UNDP (HDI)	61.23	2014	UNESCO	10.9	2018	UNDP (HDI)	9.8	2018	UNDP (HDI)
Tuvalu	0.6821	98	2014	UN E-Gov Survey	72.33	2001	UNESCO	12.3	2018	UNDP (HDI)	6.93	2017	estimation
Uganda	0.5395	76.53	2018	UNESCO	61.32	2011	UNESCO	11.2	2018	UNDP (HDI)	6.1	2018	UNDP (HDI)
Ukraine	0.8591	99.8	2015	UNDP (HDI)	93.95	2014	UNESCO	15.1	2018	UNDP (HDI)	11.3	2018	UNDP (HDI)
United Arab Emirates	0.732	93.8	2015	UNDP (HDI)	67	2014	UNESCO	13.6	2018	UNDP (HDI)	11	2018	UNDP (HDI)
United Kingdom of Great Britain and Northern Ireland	0.9292	99	2014	UNESCO	98.17	2017	UNESCO	17.4	2018	UNDP (HDI)	13	2018	UNDP (HDI)
United Republic of Tanzania	0.4659	77.89	2015	UNESCO	51.6	2017	UNESCO	8	2018	UNDP (HDI)	6	2018	UNDP (HDI)
United States of America	0.9239	99	2014	UNESCO	98.38	2017	UNESCO	16.3	2018	UNDP (HDI)	13.75	2018	UNESCO
Uruguay	0.8514	98.7	2018	UNESCO	98.67	2017	UNESCO	16.3	2018	UNDP (HDI)	8.93	2018	UNESCO
Uzbekistan	0.7434	99.99	2016	UNESCO	68.8	2017	UNESCO	12	2018	UNDP (HDI)	11.5	2018	UNDP (HDI)
Vanuatu	0.6012	87.51	2018	UNESCO	63.51	2004	UNESCO	11.4	2018	UNDP (HDI)	6.8	2018	UNDP (HDI)
Venezuela, Bolivarian Republic of	0.7807	97.13	2016	UNESCO	87.78	2009	UNESCO	12.8	2018	UNDP (HDI)	10.3	2018	UNDP (HDI)

Annex Table 13. Human Capital Index (HCI) and its components

Country	Human Capital Index (HCI)	Adult Literacy (%)			Gross Enrollment Ratio			Expected Year of Schooling			Mean Year of Schooling		
		Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source	Index Value	Year	Source
Viet Nam	0.6779	95	2018	UNESCO	66	2014	UNESCO	12.7	2018	UNDP (HDI)	8.2	2018	UNDP (HDI)
Yemen	0.4142	70.1	2015	UNDP (HDI)	54.78	2011	UNESCO	8.7	2018	UNDP (HDI)	3.2	2018	UNDP (HDI)
Zambia	0.6745	86.75	2018	UNESCO	85		UNDP	12.1	2018	UNDP (HDI)	7.1	2018	UNDP (HDI)
Zimbabwe	0.6135	86.5	2015	UNDP (HDI)	66.25	2013	UNESCO	10.5	2018	UNDP (HDI)	8.3	2018	UNDP (HDI)

Annex Table 14. Local Online Service Index (LOSI) level of 100 Municipalities

CITY	LOSI	LOSI Rank	LOSI Level	Country	Region
Madrid	0.9625	1	Very High LOSI	Spain	Europe
New York	0.9125	2	Very High LOSI	United States of America	Americas
Tallinn	0.8625	3	Very High LOSI	Estonia	Europe
Paris	0.85	4	Very High LOSI	France	Europe
Stockholm	0.85	4	Very High LOSI	Sweden	Europe
Moscow	0.8125	6	Very High LOSI	Russian Federation	Europe
Bogota	0.8	7	Very High LOSI	Colombia	Americas
Buenos Aires	0.8	7	Very High LOSI	Argentina	Americas
Berlin	0.775	9	Very High LOSI	Germany	Europe
Seoul	0.775	9	Very High LOSI	Republic of Korea	Asia
Shanghai	0.775	9	Very High LOSI	China	Asia
Istanbul	0.7625	12	Very High LOSI	Turkey	Asia
London	0.7625	12	Very High LOSI	United Kingdom of Great Britain and Northern Ireland	Europe
Roma	0.7625	12	Very High LOSI	Italy	Europe
São Paulo	0.7375	15	High LOSI	Brazil	Americas
Brussels	0.725	16	High LOSI	Belgium	Europe
Dubai	0.725	16	High LOSI	United Arab Emirates	Asia
Toronto	0.725	16	High LOSI	Canada	Americas
Helsinki	0.7125	19	High LOSI	Finland	Europe
Mexico City	0.6375	20	High LOSI	Mexico	Americas
Warsaw	0.6125	21	High LOSI	Poland	Europe
Amsterdam	0.6	22	High LOSI	Netherlands	Europe
Prague	0.6	22	High LOSI	Czechia Republic	Europe
Tokyo	0.575	24	High LOSI	Japan	Asia
Sydney	0.575	24	High LOSI	Australia	Oceania
Johannesburg	0.55	26	High LOSI	South Africa	Africa
Lisbon	0.55	26	High LOSI	Portugal	Europe
Athens	0.525	28	High LOSI	Greece	Europe
Almaty	0.5125	29	High LOSI	Kazakhstan	Asia
Kuala Lumpur	0.5125	29	High LOSI	Malaysia	Asia
Riyadh	0.4875	31	Middle LOSI	Saudi Arabia	Asia
Vienna	0.4875	31	Middle LOSI	Austria	Europe
Budapest	0.475	33	Middle LOSI	Hungary	Europe
Mumbai	0.475	33	Middle LOSI	India	Asia
Guayaquil	0.4625	35	Middle LOSI	Ecuador	Americas
Nairobi	0.4625	35	Middle LOSI	Kenya	Africa
Santo Domingo	0.4625	35	Middle LOSI	Dominican Republic	Americas
Kabul	0.45	38	Middle LOSI	Afghanistan	Asia
Bangkok	0.4375	39	Middle LOSI	Thailand	Asia
Lima	0.4125	40	Middle LOSI	Peru	Americas
Tunis	0.4125	40	Middle LOSI	Tunisia	Africa
Belgrade	0.4	42	Middle LOSI	Serbia	Europe
Colombo	0.4	42	Middle LOSI	Sri Lanka	Asia

Annex Table 14. Local Online Service Index (LOSI) level of 100 Municipalities

CITY	LOSI	LOSI Rank	LOSI Level	Country	Region
Ho Chi Minh	0.4	42	Middle LOSI	Viet Nam	Asia
Lagos	0.4	42	Middle LOSI	Nigeria	Africa
Santiago	0.4	42	Middle LOSI	Chile	Americas
Amman	0.3875	47	Middle LOSI	Jordan	Asia
Jakarta	0.3875	47	Middle LOSI	Indonesia	Asia
La Paz	0.3625	49	Middle LOSI	Bolivia (Pluractional State of)	Americas
Cairo	0.35	50	Middle LOSI	Egypt	Africa
Kiev	0.35	50	Middle LOSI	Ukraine	Europe
Guatemala City	0.325	52	Middle LOSI	Guatemala	Americas
Bucharest	0.3125	53	Middle LOSI	Romania	Europe
Addis Ababa	0.3	54	Middle LOSI	Ethiopia	Africa
Casablanca	0.3	54	Middle LOSI	Morocco	Africa
Algiers	0.2875	56	Middle LOSI	Algeria	Africa
Luanda	0.2875	56	Middle LOSI	Angola	Africa
Tashkent	0.2875	56	Middle LOSI	Uzbekistan	Asia
Kathmandu	0.275	59	Middle LOSI	Nepal	Asia
Kigali	0.275	59	Middle LOSI	Rwanda	Africa
Dushanbe	0.2625	61	Middle LOSI	Tajikistan	Asia
Harare	0.2625	61	Middle LOSI	Zimbabwe	Africa
Lusaka	0.2625	61	Middle LOSI	Zambia	Africa
Abidjan	0.225	64	Low LOSI	Côte d'Ivoire	Africa
Baku	0.225	64	Low LOSI	Azerbaijan	Asia
Dar es Salaam	0.2125	66	Low LOSI	Tanzania	Africa
Karachi	0.2125	66	Low LOSI	Pakistan	Asia
Minsk	0.2125	66	Low LOSI	Belarus	Europe
Manila	0.2	69	Low LOSI	Philippines	Asia
Havana	0.1875	70	Low LOSI	Cuba	Americas
Yangon	0.1875	70	Low LOSI	Myanmar	Asia
Baghdad	0.175	72	Low LOSI	Iraq	Asia
Kampala	0.175	72	Low LOSI	Uganda	Africa
Caracas	0.1625	74	Low LOSI	Venezuela, Bolivarian Republic of	Americas
Dhaka	0.15	75	Low LOSI	Bangladesh	Asia
Tehran	0.15	75	Low LOSI	Iran (Islamic Republic of)	Asia
Damascus	0.1375	77	Low LOSI	Syrian Arab Republic	Asia
Phnom Penh	0.125	78	Low LOSI	Cambodia	Asia
Tegucigalpa	0.125	78	Low LOSI	Honduras	Americas
Antananarivo	0.1125	80	Low LOSI	Madagascar	Africa
Ouagadougou	0.1	81	Low LOSI	Burkina Faso	Africa
Porto Moresby	0.0875	82	Low LOSI	Papua New Guinea	Oceania
Kumasi	0.0875	82	Low LOSI	Ghana	Africa
Porto Novo	0.0625	84	Low LOSI	Benin	Africa
Bujumbura	0.0625	84	Low LOSI	Burundi	Africa
Lilongwe	0.05	86	Low LOSI	Malawi	Africa

Annex Table 15. Municipalities Grouped by Local Online Service Index (LOSI) level

Very High LOSI	High LOSI	Middle LOSI	Low LOSI
Madrid	São Paulo	Riyadh	Abidjan
New York	Dubai	Vienna	Baku
Tallinn	Toronto	Budapest	Dar es Salaam
Paris	Brussels	Mumbai	Karachi
Stockholm	Helsinki	Guayaquil	Minsk
Moscow	Mexico City	Nairobi	Manila
Bogota	Warsaw	Santo Domingo	Havana
Buenos Aires	Amsterdam	Kabul	Yangon
Berlin	Prague	Bangkok	Baghdad
Seoul	Tokyo	Lima	Kampala
Shanghai	Sydney	Tunis	Caracas
Istanbul	Johannesburg	Belgrade	Dhaka
London	Lisbon	Colombo	Tehran
Roma	Athens	Ho Chi Minh	Damascus
	Almaty	Lagos	Phnom Penh
	Kuala Lumpur	Santiago	Tegucigalpa
		Amman	Antananarivo
		Jakarta	Ouagadougou
		La Paz	Porto Moresby
		Cairo	Kumasi
		Kiev	Porto Novo
		Guatemala City	Bujumbura
		Bucharest	Lilongwe
		Addis Ababa	
		Casablanca	
		Algiers	
		Luanda	
		Tashkent	
		Kathmandu	
		Kigali	
		Dushanbe	
		Harare	
		Lusaka	

Annex Table 16. E-Participation Index (EPI) and its utilisation by stages

Rank	Country	EPI	EPI level	Total Utilisation (%)	Stage One (%)	Stage Two (%)	Stage Three (%)
118	Afghanistan	0.4643	Middle EPI	47.67%	53.70%	52.38%	9.09%
36	Albania	0.8452	Very High EPI	84.88%	90.74%	95.24%	36.36%
183	Algeria	0.1548	Low EPI	17.44%	18.52%	19.05%	9.09%
106	Andorra	0.5119	High EPI	52.33%	70.37%	23.81%	18.18%
122	Angola	0.4524	Middle EPI	46.51%	48.15%	42.86%	45.45%
114	Antigua and Barbuda	0.4881	Middle EPI	50.00%	62.96%	28.57%	27.27%
29	Argentina	0.8571	Very High EPI	86.05%	88.89%	95.24%	54.55%
57	Armenia	0.75	Very High EPI	75.58%	79.63%	66.67%	72.73%
9	Australia	0.9643	Very High EPI	96.51%	98.15%	95.24%	90.91%
6	Austria	0.9762	Very High EPI	97.67%	100.00%	90.48%	100.00%
73	Azerbaijan	0.6905	High EPI	69.77%	83.33%	57.14%	27.27%
85	Bahamas	0.619	High EPI	62.79%	64.81%	61.90%	54.55%
51	Bahrain	0.7738	Very High EPI	77.91%	79.63%	76.19%	72.73%
95	Bangladesh	0.5714	High EPI	58.14%	62.96%	61.90%	27.27%
90	Barbados	0.5952	High EPI	60.47%	61.11%	61.90%	54.55%
57	Belarus	0.75	Very High EPI	75.58%	88.89%	57.14%	45.45%
77	Belgium	0.6548	High EPI	66.28%	79.63%	42.86%	45.45%
163	Belize	0.2976	Middle EPI	31.40%	37.04%	33.33%	0.00%
100	Benin	0.5476	High EPI	55.81%	68.52%	42.86%	18.18%
82	Bhutan	0.631	High EPI	63.95%	68.52%	57.14%	54.55%
90	Bolivia (Plurinational State of)	0.5952	High EPI	60.47%	75.93%	47.62%	9.09%
87	Bosnia and Herzegovina	0.6071	High EPI	61.63%	70.37%	52.38%	36.36%
137	Botswana	0.369	Middle EPI	38.37%	48.15%	33.33%	0.00%
18	Brazil	0.9048	Very High EPI	90.70%	94.44%	100.00%	54.55%
100	Brunei Darussalam	0.5476	High EPI	55.81%	66.67%	52.38%	9.09%
23	Bulgaria	0.8929	Very High EPI	89.53%	92.59%	80.95%	90.91%
106	Burkina Faso	0.5119	High EPI	52.33%	70.37%	23.81%	18.18%
148	Burundi	0.3333	Middle EPI	34.88%	46.30%	19.05%	9.09%
129	Cabo Verde	0.4167	Middle EPI	43.02%	44.44%	57.14%	9.09%
129	Cambodia	0.4167	Middle EPI	43.02%	53.70%	33.33%	9.09%
129	Cameroon	0.4167	Middle EPI	43.02%	53.70%	23.81%	27.27%
16	Canada	0.9405	Very High EPI	94.19%	92.59%	95.24%	100.00%
184	Central African Republic	0.1429	Low EPI	16.28%	20.37%	14.29%	0.00%
168	Chad	0.2619	Middle EPI	27.91%	38.89%	14.29%	0.00%
29	Chile	0.8571	Very High EPI	86.05%	90.74%	80.95%	72.73%
9	China	0.9643	Very High EPI	96.51%	96.30%	100.00%	90.91%
27	Colombia	0.869	Very High EPI	87.21%	92.59%	85.71%	63.64%
185	Comoros	0.119	Low EPI	13.95%	18.52%	9.52%	0.00%
166	Congo	0.2738	Middle EPI	29.07%	38.89%	19.05%	0.00%

Annex Table 16. E-Participation Index (EPI) and its utilisation by stages

Rank	Country	EPI	EPI level	Total Utilisation (%)	Stage One (%)	Stage Two (%)	Stage Three (%)
77	Costa Rica	0.6548	High EPI	66.28%	72.22%	66.67%	36.36%
133	Côte d'Ivoire	0.4048	Middle EPI	41.86%	44.44%	52.38%	9.09%
23	Croatia	0.8929	Very High EPI	89.53%	92.59%	80.95%	90.91%
142	Cuba	0.3571	Middle EPI	37.21%	42.59%	33.33%	18.18%
14	Cyprus	0.9524	Very High EPI	95.35%	96.30%	90.48%	100.00%
65	Czech Republic	0.7262	High EPI	73.26%	81.48%	66.67%	45.45%
189	Democratic People's Republic of Korea	0.0357	Low EPI	5.81%	9.26%	0.00%	0.00%
179	Democratic Republic of the Congo	0.2024	Low EPI	22.09%	31.48%	9.52%	0.00%
9	Denmark	0.9643	Very High EPI	96.51%	100.00%	95.24%	81.82%
175	Djibouti	0.2143	Low EPI	23.26%	29.63%	19.05%	0.00%
142	Dominica	0.3571	Middle EPI	37.21%	42.59%	33.33%	18.18%
51	Dominican Republic	0.7738	Very High EPI	77.91%	88.89%	71.43%	36.36%
49	Ecuador	0.7976	Very High EPI	80.23%	83.33%	76.19%	72.73%
106	Egypt	0.5119	High EPI	52.33%	57.41%	52.38%	27.27%
75	El Salvador	0.6786	High EPI	68.60%	72.22%	71.43%	45.45%
188	Equatorial Guinea	0.0714	Low EPI	9.30%	11.11%	9.52%	0.00%
193	Eritrea	0	Low EPI	2.33%	3.70%	0.00%	0.00%
1	Estonia	1	Very High EPI	100.00%	100.00%	100.00%	100.00%
122	Eswatini	0.4524	Middle EPI	46.51%	55.56%	47.62%	0.00%
148	Ethiopia	0.3333	Middle EPI	34.88%	38.89%	33.33%	18.18%
118	Fiji	0.4643	Middle EPI	47.67%	59.26%	38.10%	9.09%
14	Finland	0.9524	Very High EPI	95.35%	98.15%	100.00%	72.73%
18	France	0.9048	Very High EPI	90.70%	94.44%	85.71%	81.82%
166	Gabon	0.2738	Middle EPI	29.07%	37.04%	23.81%	0.00%
189	Gambia (Republic of The)	0.0357	Low EPI	5.81%	7.41%	4.76%	0.00%
80	Georgia	0.6429	High EPI	65.12%	77.78%	57.14%	18.18%
57	Germany	0.75	Very High EPI	75.58%	81.48%	71.43%	54.55%
82	Ghana	0.631	High EPI	63.95%	70.37%	57.14%	45.45%
50	Greece	0.7857	Very High EPI	79.07%	83.33%	80.95%	54.55%
148	Grenada	0.3333	Middle EPI	34.88%	40.74%	33.33%	9.09%
112	Guatemala	0.5	High EPI	51.16%	62.96%	28.57%	36.36%
158	Guinea	0.3095	Middle EPI	32.56%	33.33%	33.33%	27.27%
187	Guinea-Bissau	0.0833	Low EPI	10.47%	11.11%	14.29%	0.00%
122	Guyana	0.4524	Middle EPI	46.51%	50.00%	61.90%	0.00%
174	Haiti	0.2262	Low EPI	24.42%	25.93%	23.81%	18.18%
114	Honduras	0.4881	Middle EPI	50.00%	55.56%	47.62%	27.27%
75	Hungary	0.6786	High EPI	68.60%	81.48%	52.38%	36.36%
51	Iceland	0.7738	Very High EPI	77.91%	81.48%	66.67%	81.82%
29	India	0.8571	Very High EPI	86.05%	92.59%	80.95%	63.64%

Annex Table 16. E-Participation Index (EPI) and its utilisation by stages

Rank	Country	EPI	EPI level	Total Utilisation (%)	Stage One (%)	Stage Two (%)	Stage Three (%)
57	Indonesia	0.75	Very High EPI	75.58%	81.48%	66.67%	63.64%
118	Iran (Islamic Republic of)	0.4643	Middle EPI	47.67%	57.41%	42.86%	9.09%
158	Iraq	0.3095	Middle EPI	32.56%	40.74%	19.05%	18.18%
29	Ireland	0.8571	Very High EPI	86.05%	90.74%	80.95%	72.73%
66	Israel	0.7143	High EPI	72.09%	74.07%	61.90%	81.82%
41	Italy	0.8214	Very High EPI	82.56%	92.59%	76.19%	45.45%
137	Jamaica	0.369	Middle EPI	38.37%	46.30%	33.33%	9.09%
4	Japan	0.9881	Very High EPI	98.84%	100.00%	95.24%	100.00%
148	Jordan	0.3333	Middle EPI	34.88%	37.04%	42.86%	9.09%
26	Kazakhstan	0.881	Very High EPI	88.37%	96.30%	100.00%	27.27%
90	Kenya	0.5952	High EPI	60.47%	70.37%	52.38%	27.27%
98	Kiribati	0.5595	High EPI	56.98%	64.81%	47.62%	36.36%
18	Kuwait	0.9048	Very High EPI	90.70%	94.44%	90.48%	72.73%
66	Kyrgyzstan	0.7143	High EPI	72.09%	77.78%	66.67%	54.55%
175	Lao People's Democratic Republic	0.2143	Low EPI	23.26%	31.48%	4.76%	18.18%
93	Latvia	0.5833	High EPI	59.30%	70.37%	47.62%	27.27%
148	Lebanon	0.3333	Middle EPI	34.88%	40.74%	33.33%	9.09%
146	Lesotho	0.3452	Middle EPI	36.05%	48.15%	19.05%	9.09%
172	Liberia	0.2381	Low EPI	25.58%	31.48%	14.29%	18.18%
189	Libya	0.0357	Low EPI	5.81%	5.56%	4.76%	9.09%
87	Liechtenstein	0.6071	High EPI	61.63%	79.63%	33.33%	27.27%
64	Lithuania	0.7381	High EPI	74.42%	85.19%	66.67%	36.36%
70	Luxembourg	0.7024	High EPI	70.93%	81.48%	61.90%	36.36%
163	Madagascar	0.2976	Middle EPI	31.40%	37.04%	33.33%	0.00%
129	Malawi	0.4167	Middle EPI	43.02%	51.85%	38.10%	9.09%
29	Malaysia	0.8571	Very High EPI	86.05%	98.15%	80.95%	36.36%
126	Maldives	0.4405	Middle EPI	45.35%	53.70%	42.86%	9.09%
155	Mali	0.3214	Middle EPI	33.72%	40.74%	28.57%	9.09%
38	Malta	0.8333	Very High EPI	83.72%	83.33%	76.19%	100.00%
128	Marshall Islands	0.4286	Middle EPI	44.19%	59.26%	23.81%	9.09%
186	Mauritania	0.0952	Low EPI	11.63%	14.81%	9.52%	0.00%
80	Mauritius	0.6429	High EPI	65.12%	77.78%	52.38%	27.27%
41	Mexico	0.8214	Very High EPI	82.56%	87.04%	85.71%	54.55%
148	Micronesia (Federated States of)	0.3333	Middle EPI	34.88%	48.15%	19.05%	0.00%
137	Monaco	0.369	Middle EPI	38.37%	44.44%	33.33%	18.18%
87	Mongolia	0.6071	High EPI	61.63%	64.81%	66.67%	36.36%
100	Montenegro	0.5476	High EPI	55.81%	57.41%	71.43%	18.18%
106	Morocco	0.5119	High EPI	52.33%	55.56%	57.14%	27.27%
103	Mozambique	0.5238	High EPI	53.49%	59.26%	52.38%	27.27%

Annex Table 16. E-Participation Index (EPI) and its utilisation by stages

Rank	Country	EPI	EPI level	Total Utilisation (%)	Stage One (%)	Stage Two (%)	Stage Three (%)
168	Myanmar	0.2619	Middle EPI	27.91%	33.33%	19.05%	18.18%
112	Namibia	0.5	High EPI	51.16%	55.56%	47.62%	36.36%
179	Nauru	0.2024	Low EPI	22.09%	29.63%	14.29%	0.00%
137	Nepal	0.369	Middle EPI	38.37%	38.89%	42.86%	27.27%
9	Netherlands	0.9643	Very High EPI	96.51%	96.30%	95.24%	100.00%
4	New Zealand	0.9881	Very High EPI	98.84%	100.00%	95.24%	100.00%
103	Nicaragua	0.5238	High EPI	53.49%	57.41%	52.38%	36.36%
163	Niger	0.2976	Middle EPI	31.40%	38.89%	23.81%	9.09%
114	Nigeria	0.4881	Middle EPI	50.00%	59.26%	47.62%	9.09%
38	North Macedonia	0.8333	Very High EPI	83.72%	85.19%	80.95%	81.82%
18	Norway	0.9048	Very High EPI	90.70%	100.00%	85.71%	54.55%
38	Oman	0.8333	Very High EPI	83.72%	81.48%	90.48%	81.82%
103	Pakistan	0.5238	High EPI	53.49%	57.41%	52.38%	36.36%
155	Palau	0.3214	Middle EPI	33.72%	48.15%	14.29%	0.00%
93	Panama	0.5833	High EPI	59.30%	70.37%	52.38%	18.18%
175	Papua New Guinea	0.2143	Low EPI	23.26%	33.33%	4.76%	9.09%
57	Paraguay	0.75	Very High EPI	75.58%	77.78%	80.95%	54.55%
55	Peru	0.7619	Very High EPI	76.74%	85.19%	80.95%	27.27%
57	Philippines	0.75	Very High EPI	75.58%	90.74%	57.14%	36.36%
9	Poland	0.9643	Very High EPI	96.51%	96.30%	95.24%	100.00%
41	Portugal	0.8214	Very High EPI	82.56%	90.74%	80.95%	45.45%
77	Qatar	0.6548	High EPI	66.28%	68.52%	71.43%	45.45%
1	Republic of Korea	1	Very High EPI	100.00%	100.00%	100.00%	100.00%
55	Republic of Moldova	0.7619	Very High EPI	76.74%	81.48%	76.19%	54.55%
46	Romania	0.8095	Very High EPI	81.40%	90.74%	71.43%	54.55%
27	Russian Federation	0.869	Very High EPI	87.21%	87.04%	95.24%	72.73%
82	Rwanda	0.631	High EPI	63.95%	66.67%	76.19%	27.27%
148	Saint Kitts and Nevis	0.3333	Middle EPI	34.88%	35.19%	42.86%	18.18%
134	Saint Lucia	0.3929	Middle EPI	40.70%	48.15%	33.33%	18.18%
118	Saint Vincent and the Grenadines	0.4643	Middle EPI	47.67%	59.26%	33.33%	18.18%
170	Samoa	0.25	Middle EPI	26.74%	27.78%	33.33%	9.09%
158	San Marino	0.3095	Middle EPI	32.56%	37.04%	33.33%	9.09%
179	Sao Tome and Principe	0.2024	Low EPI	22.09%	22.22%	28.57%	9.09%
66	Saudi Arabia	0.7143	High EPI	72.09%	74.07%	80.95%	45.45%
126	Senegal	0.4405	Middle EPI	45.35%	57.41%	33.33%	9.09%
41	Serbia	0.8214	Very High EPI	82.56%	92.59%	71.43%	54.55%
95	Seychelles	0.5714	High EPI	58.14%	57.41%	66.67%	45.45%
134	Sierra Leone	0.3929	Middle EPI	40.70%	51.85%	28.57%	9.09%
6	Singapore	0.9762	Very High EPI	97.67%	98.15%	95.24%	100.00%
70	Slovakia	0.7024	High EPI	70.93%	75.93%	52.38%	81.82%

Annex Table 16. E-Participation Index (EPI) and its utilisation by stages

Rank	Country	EPI	EPI level	Total Utilisation (%)	Stage One (%)	Stage Two (%)	Stage Three (%)
29	Slovenia	0.8571	Very High EPI	86.05%	92.59%	85.71%	54.55%
155	Solomon Islands	0.3214	Middle EPI	33.72%	48.15%	14.29%	0.00%
142	Somalia	0.3571	Middle EPI	37.21%	46.30%	9.52%	45.45%
57	South Africa	0.75	Very High EPI	75.58%	87.04%	57.14%	54.55%
192	South Sudan	0.0238	Low EPI	4.65%	5.56%	0.00%	9.09%
36	Spain	0.8452	Very High EPI	84.88%	90.74%	95.24%	36.36%
66	Sri Lanka	0.7143	High EPI	72.09%	83.33%	57.14%	45.45%
175	Sudan	0.2143	Low EPI	23.26%	27.78%	23.81%	0.00%
170	Suriname	0.25	Middle EPI	26.74%	40.74%	4.76%	0.00%
41	Sweden	0.8214	Very High EPI	82.56%	90.74%	71.43%	63.64%
18	Switzerland	0.9048	Very High EPI	90.70%	96.30%	90.48%	63.64%
106	Syrian Arab Republic	0.5119	High EPI	52.33%	66.67%	33.33%	18.18%
146	Tajikistan	0.3452	Middle EPI	36.05%	35.19%	33.33%	45.45%
51	Thailand	0.7738	Very High EPI	77.91%	85.19%	76.19%	45.45%
114	Timor-Leste	0.4881	Middle EPI	50.00%	62.96%	28.57%	27.27%
106	Togo	0.5119	High EPI	52.33%	55.56%	52.38%	36.36%
137	Tonga	0.369	Middle EPI	38.37%	50.00%	23.81%	9.09%
85	Trinidad and Tobago	0.619	High EPI	62.79%	74.07%	52.38%	27.27%
73	Tunisia	0.6905	High EPI	69.77%	68.52%	76.19%	63.64%
23	Turkey	0.8929	Very High EPI	89.53%	92.59%	85.71%	81.82%
179	Turkmenistan	0.2024	Low EPI	22.09%	33.33%	4.76%	0.00%
142	Tuvalu	0.3571	Middle EPI	37.21%	53.70%	14.29%	0.00%
95	Uganda	0.5714	High EPI	58.14%	70.37%	42.86%	27.27%
46	Ukraine	0.8095	Very High EPI	81.40%	79.63%	80.95%	90.91%
16	United Arab Emirates	0.9405	Very High EPI	94.19%	98.15%	95.24%	72.73%
6	United Kingdom of Great Britain and Northern Ireland	0.9762	Very High EPI	97.67%	98.15%	95.24%	100.00%
98	United Republic of Tanzania	0.5595	High EPI	56.98%	64.81%	52.38%	27.27%
1	United States of America	1	Very High EPI	100.00%	100.00%	100.00%	100.00%
29	Uruguay	0.8571	Very High EPI	86.05%	92.59%	76.19%	72.73%
46	Uzbekistan	0.8095	Very High EPI	81.40%	90.74%	80.95%	36.36%
134	Vanuatu	0.3929	Middle EPI	40.70%	44.44%	38.10%	27.27%
172	Venezuela, Bolivarian Republic of	0.2381	Low EPI	25.58%	25.93%	28.57%	18.18%
70	Viet Nam	0.7024	High EPI	70.93%	77.78%	57.14%	63.64%
158	Yemen	0.3095	Middle EPI	32.56%	42.59%	14.29%	18.18%
158	Zambia	0.3095	Middle EPI	32.56%	44.44%	19.05%	0.00%
122	Zimbabwe	0.4524	Middle EPI	46.51%	53.70%	42.86%	18.18%

Annex Table 17. Regional and Economic Groupings for E-Participation Index (EPI)

Region / Grouping	EPI	Total Utilisation (%)	Stage One (%)	Stage Two (%)	Stage Three (%)
Africa	0.3613	0.3762	0.4393	0.3272	0.1599
Americas	0.5887	0.5983	0.6566	0.5701	0.3662
Asia	0.6294	0.638	0.6978	0.5907	0.4352
Europe	0.7837	0.7888	0.8497	0.732	0.5983
Oceania	0.4404	0.4535	0.5463	0.3402	0.2143
World	0.5677	0.5778	0.6409	0.5265	0.366
Least Developed Countries	0.3378	0.3533	0.5934	0.2807	0.1509
Landlocked Developing Countries	0.481	0.4931	0.5666	0.436	0.2415
Small Island Developing States	0.4172	0.4308	0.4228	0.3684	0.1938
Income level	**EPI**	**Total Utilisation (%)**	**Stage One (%)**	**Stage Two (%)**	**Stage Three (%)**
High Income	0.774	0.7793	0.8305	0.7307	0.6207
Upper Middle Income	0.5568	0.5672	0.6379	0.5238	0.3141
Lower Middle Income	0.4829	0.495	0.4683	0.44	0.2648
Low Income	0.3279	0.3436	0.4138	0.278	0.1554

Annex Table 18. Open Government Data Index OGDI)

Country	Region	OGDI	OGDI level
Afghanistan	Asia	0.5042	Middle OGDI
Albania	Europe	0.8969	High OGDI
Algeria	Africa	0.1177	Low OGDI
Andorra	Europe	0.5792	Middle OGDI
Angola	Africa	0.0344	Low OGDI
Antigua and Barbuda	Americas	0.8281	High OGDI
Argentina	Americas	1.0000	Very High OGDI
Armenia	Asia	0.6271	Middle OGDI
Australia	Oceania	1.0000	Very High OGDI
Austria	Europe	1.0000	Very High OGDI
Azerbaijan	Asia	0.8479	High OGDI
Bahamas	Americas	0.5583	Middle OGDI
Bahrain	Asia	0.8281	High OGDI
Bangladesh	Asia	0.5250	Middle OGDI
Barbados	Americas	0.3438	Low OGDI
Belarus	Europe	0.9656	High OGDI
Belgium	Europe	0.9313	High OGDI
Belize	Americas	0.0688	Low OGDI
Benin	Africa	0.7104	Middle OGDI
Bhutan	Asia	0.6760	Middle OGDI
Bolivia (Plurinational State of)	Americas	0.6958	Middle OGDI
Bosnia and Herzegovina	Europe	0.3927	Low OGDI
Botswana	Africa	0.1865	Low OGDI
Brazil	Americas	1.0000	Very High OGDI
Brunei Darussalam	Asia	0.5250	Middle OGDI
Bulgaria	Europe	1.0000	Very High OGDI
Burkina Faso	Africa	0.8625	High OGDI
Burundi	Africa	0.3042	Low OGDI
Cabo Verde	Africa	0.2354	Low OGDI
Cambodia	Asia	0.3240	Low OGDI
Cameroon	Africa	0.2406	Low OGDI
Canada	Americas	1.0000	Very High OGDI
Central African Republic	Africa	0.0000	Low OGDI
Chad	Africa	0.2208	Low OGDI
Chile	Americas	0.7313	Middle OGDI
China	Asia	1.0000	Very High OGDI
Colombia	Americas	1.0000	Very High OGDI
Comoros	Africa	0.0000	Low OGDI
Congo	Africa	0.0688	Low OGDI
Costa Rica	Americas	0.8135	High OGDI
Côte d'Ivoire	Africa	0.2833	Low OGDI
Croatia	Europe	0.8625	High OGDI

Annex Table 18. Open Government Data Index OGDI)

Country	Region	OGDI	OGDI level
Cuba	Americas	0.0000	Low OGDI
Cyprus	Asia	1.0000	Very High OGDI
Czech Republic	Europe	1.0000	Very High OGDI
Democratic People's Republic of Korea	Asia	0.0833	Low OGDI
Democratic Republic of the Congo	Africa	0.1521	Low OGDI
Denmark	Europe	1.0000	Very High OGDI
Djibouti	Africa	0.0688	Low OGDI
Dominica	Americas	0.0000	Low OGDI
Dominican Republic	Americas	0.8333	High OGDI
Ecuador	Americas	0.8281	High OGDI
Egypt	Africa	0.2896	Low OGDI
El Salvador	Americas	0.6958	Middle OGDI
Equatorial Guinea	Africa	0.0000	Low OGDI
Eritrea	Africa	0.0000	Low OGDI
Estonia	Europe	1.0000	Very High OGDI
Eswatini	Africa	0.4208	Middle OGDI
Ethiopia	Africa	0.5729	Middle OGDI
Fiji	Oceania	0.3240	Low OGDI
Finland	Europe	1.0000	Very High OGDI
France	Europe	1.0000	Very High OGDI
Gabon	Africa	0.2000	Low OGDI
Gambia (Republic of The)	Africa	0.0000	Low OGDI
Georgia	Asia	0.8625	High OGDI
Germany	Europe	1.0000	Very High OGDI
Ghana	Africa	0.9313	High OGDI
Greece	Europe	1.0000	Very High OGDI
Grenada	Americas	0.0344	Low OGDI
Guatemala	Americas	0.8135	High OGDI
Guinea	Africa	0.4417	Middle OGDI
Guinea-Bissau	Africa	0.2833	Low OGDI
Guyana	Americas	0.3042	Low OGDI
Haiti	Americas	0.1031	Low OGDI
Honduras	Americas	0.5729	Middle OGDI
Hungary	Europe	0.8625	High OGDI
Iceland	Europe	0.7646	Middle OGDI
India	Asia	1.0000	Very High OGDI
Indonesia	Asia	1.0000	Very High OGDI
Iran (Islamic Republic of)	Asia	0.4073	Low OGDI
Iraq	Asia	0.0000	Low OGDI
Ireland	Europe	1.0000	Very High OGDI
Israel	Asia	0.7594	Middle OGDI

Annex Table 18. Open Government Data Index OGDI)

Country	Region	OGDI	OGDI level
Italy	Europe	1.0000	Very High OGDI
Jamaica	Americas	0.3385	Low OGDI
Japan	Asia	1.0000	Very High OGDI
Jordan	Asia	0.5729	Middle OGDI
Kazakhstan	Asia	1.0000	Very High OGDI
Kenya	Africa	0.8479	High OGDI
Kiribati	Oceania	0.4906	Middle OGDI
Kuwait	Asia	0.8479	High OGDI
Kyrgyzstan	Asia	0.6958	Middle OGDI
Lao People's Democratic Republic	Asia	0.0000	Low OGDI
Latvia	Europe	0.8625	High OGDI
Lebanon	Asia	0.0688	Low OGDI
Lesotho	Africa	0.3583	Low OGDI
Liberia	Africa	0.1521	Low OGDI
Libya	Africa	0.0000	Low OGDI
Liechtenstein	Europe	0.7792	Middle OGDI
Lithuania	Europe	0.6969	Middle OGDI
Luxembourg	Europe	0.9656	High OGDI
Madagascar	Africa	0.1865	Low OGDI
Malawi	Africa	0.5729	Middle OGDI
Malaysia	Asia	1.0000	Very High OGDI
Maldives	Asia	0.1031	Low OGDI
Mali	Africa	0.1031	Low OGDI
Malta	Europe	0.7792	Middle OGDI
Marshall Islands	Oceania	0.4760	Middle OGDI
Mauritania	Africa	0.0688	Low OGDI
Mauritius	Africa	0.9313	High OGDI
Mexico	Americas	1.0000	Very High OGDI
Micronesia (Federated States of)	Oceania	0.3927	Low OGDI
Monaco	Europe	0.1375	Low OGDI
Mongolia	Asia	0.8281	High OGDI
Montenegro	Europe	0.8281	High OGDI
Morocco	Africa	0.7104	Middle OGDI
Mozambique	Africa	0.6906	Middle OGDI
Myanmar	Asia	0.2354	Low OGDI
Namibia	Africa	0.1865	Low OGDI
Nauru	Oceania	0.1719	Low OGDI
Nepal	Asia	0.4698	Middle OGDI
Netherlands	Europe	1.0000	Very High OGDI
New Zealand	Oceania	1.0000	Very High OGDI
Nicaragua	Americas	0.2406	Low OGDI
Niger	Africa	0.1521	Low OGDI

Annex Table 18. Open Government Data Index OGDI)

Country	Region	OGDI	OGDI level
Nigeria	Africa	0.3865	Low OGDI
North Macedonia	Europe	0.8479	High OGDI
Norway	Europe	1.0000	Very High OGDI
Oman	Asia	0.7938	Middle OGDI
Pakistan	Asia	0.1521	Low OGDI
Palau	Oceania	0.5583	Middle OGDI
Panama	Americas	0.8969	High OGDI
Papua New Guinea	Oceania	0.2208	Low OGDI
Paraguay	Americas	0.7938	Middle OGDI
Peru	Americas	0.9656	High OGDI
Philippines	Asia	1.0000	Very High OGDI
Poland	Europe	0.9313	High OGDI
Portugal	Europe	1.0000	Very High OGDI
Qatar	Asia	0.8625	High OGDI
Republic of Korea	Asia	1.0000	Very High OGDI
Republic of Moldova	Europe	1.0000	Very High OGDI
Romania	Europe	0.9313	High OGDI
Russian Federation	Europe	1.0000	Very High OGDI
Rwanda	Africa	0.6417	Middle OGDI
Saint Kitts and Nevis	Americas	0.0688	Low OGDI
Saint Lucia	Americas	0.6281	Middle OGDI
Saint Vincent and the Grenadines	Americas	0.5104	Middle OGDI
Samoa	Oceania	0.2208	Low OGDI
San Marino	Europe	0.0000	Low OGDI
Sao Tome and Principe	Africa	0.0833	Low OGDI
Saudi Arabia	Asia	1.0000	Very High OGDI
Senegal	Africa	0.3385	Low OGDI
Serbia	Europe	0.8479	High OGDI
Seychelles	Africa	0.4760	Middle OGDI
Sierra Leone	Africa	0.6271	Middle OGDI
Singapore	Asia	1.0000	Very High OGDI
Slovakia	Europe	0.8625	High OGDI
Slovenia	Europe	0.9313	High OGDI
Solomon Islands	Oceania	0.3042	Low OGDI
Somalia	Africa	0.4208	Middle OGDI
South Africa	Africa	0.8969	High OGDI
South Sudan	Africa	0.0000	Low OGDI
Spain	Europe	0.9313	High OGDI
Sri Lanka	Asia	0.8281	High OGDI
Sudan	Africa	0.0688	Low OGDI
Suriname	Americas	0.3031	Low OGDI
Sweden	Europe	1.0000	Very High OGDI

Annex Table 18. Open Government Data Index OGDI)

Country	Region	OGDI	OGDI level
Switzerland	Europe	0.9313	High OGDI
Syrian Arab Republic	Asia	0.2406	Low OGDI
Tajikistan	Asia	0.2896	Low OGDI
Thailand	Asia	1.0000	Very High OGDI
Timor-Leste	Asia	0.3729	Low OGDI
Togo	Africa	0.2010	Low OGDI
Tonga	Oceania	0.2063	Low OGDI
Trinidad and Tobago	Americas	0.7104	Middle OGDI
Tunisia	Africa	0.7938	Middle OGDI
Turkey	Asia	0.9313	High OGDI
Turkmenistan	Asia	0.0000	Low OGDI
Tuvalu	Oceania	0.4906	Middle OGDI
Uganda	Africa	0.8625	High OGDI
Ukraine	Europe	0.8969	High OGDI
United Arab Emirates	Asia	1.0000	Very High OGDI
United Kingdom of Great Britain and Northern Ireland	Europe	1.0000	Very High OGDI
United Republic of Tanzania	Africa	0.7938	Middle OGDI
United States of America	Americas	1.0000	Very High OGDI
Uruguay	Americas	1.0000	Very High OGDI
Uzbekistan	Asia	1.0000	Very High OGDI
Vanuatu	Oceania	0.1521	Low OGDI
Venezuela, Bolivarian Republic of	Americas	0.2208	Low OGDI
Viet Nam	Asia	0.6760	Middle OGDI
Yemen	Asia	0.0000	Low OGDI
Zambia	Africa	0.5792	Middle OGDI
Zimbabwe	Africa	0.2896	Low OGDI

Online Services Index research

The 2020 edition engaged a number of United Nations Volunteers, United Nations staff and interns in the assessments for the Online Services Index.

These researchers included: Khaled Hosam Mohamed Abdelhamed, Zardasht Nesraddin Abdi, Fausia Abdoel, Amirjon Abdukodirov, Abdulla Abdulrahman,Hafte Abera, Dace Abola, Aldhel Adique, Mourifie Adou, Stephen Michael Agada, Rajesh Agrawal, Alena Akimova, Anait Akopyan, Hanan AL-Saggaf, Md. Mamotaj Ali, Maymun Ali, Kristyn Alldredge, Nadia Almoussawi, Mahmoud Alzoubi, Abdulmalik Amein, Jing Yuh Ang, Edgar Apaza, Wagner Araujo, Nidya Astrini, Courtney Aubertin, Evgeny Bachevsky, Maia Baghaturia, Cecile Ballorain, Marija Batic, Katrin Bauer, Gulnar Bayramova, Lorena Belenky, Sarah Bertrand, Matea Beslic, Alexandra Bettencourt, Kenia Marjory de Souza Oliveira Brochado, Carolina Diaz Canto, Maria Capogreco, Sudeshna Chakraborty, Robert Cheung, Merve Cigerci, Debra Cole, Bassem Dabas, Fabien Dany, Uyauga Dashdorj, Alexandra Deák, Ana Caballero Diaz, Jorge Luis Díaz, Rinchen Dorji, Sofiia Dunets, Mohamed Elfateh Ahmed Ebrahim, Lena Edouard, Naseer Ellahi, Momen Essam, Tshering Eudon, Karla Fabon, Abdullah Farah, Michele Favero, Yue Feng, Debora Cerro Fernandez, Paloma Fernández, Hadas Fischer-Rosenberg, Vivienne Fleming, Lucas Foganholo, Karla Freyre, Salvador Galarza, Brenda Nelly Herrera Garcia, Tewodros Dugasa Gebre, Solomon Tesfay Ghebrehiwet, Natia Ghvinjilia, Maria Gigourtaki, Sophie Giguère, Anna Glukhova, Camila Gómez, Gabby Greyem, Xian Guan, Niccolò Guerrieri, Shabnam Hasanova, Ahmed Hassan, Ana Herrera, Faith Ho, Sofie Holmberg, Jessica Howard, Saw Htoo, Zigeng Huang, Ifham Adam Ibrahim, Maël Ihamouchène, Gudrun Helga Johannsdottir, Zoran Jordanoski, Ferdinand Joseph, Sasa Jovanovic, Francisco Luiz Marzinotto Junior, Sandra Just, Eliz Kaptan, Blondel Kasse, Agnieszka Kazmierska, Poulomi Kha, Salma Khalaf, Hassaan Ali Khan, Hyejun Kim, Jaejin Kim, Pingkan Audrine Kosijungan, Helena Kovacs, Anthony Kulemba, Ana Kurkhuli, Marta Kusnierska, Stavros Lazarou, Thi Huyen Le, Tatiane Caroline Rocha Lemos, Doukessa Lerias, Prabina Limbu, Kyaw Zan Linn, Jeanic Lubanza, Prabin Maharjan, Mounia Malki, Victoria Hansson Malmlof, Raymond Selorm Mamattah, Diana Martins, Siofradh McMahon, Igor Medeiros, Dennis Mehlau, Izumi Miki, Thomas Miller, Ohnmar Min, Jonathan H. Mishal, Nicholas Mugabi, Richard Mustafa, Leah Mwainyekule, Guy Nicolas Nahimana, Landry Mbe Ndetatsin, Aurelie Ngo, Morten Meyerhoff Nielsen, Patrick Nitegeka, Shaima Noor, Nina Nout, Austine Nwakanma, Maroufath Shade Ogoussan,Sofia Olofsson, Eleni Omiridou, Andrea Marcela Recinos Orellana, Ghazal Ozairi, Peme Paco, Elena Panova, Cesar Perez, Gonzalo Picatoste, Pietari Pikkuaho, José Pimentel, Ana Carolina Tomé Pires, Mehdi Partovi Pirooz, Yuliya Pismennaya, Charlie Pitcairn, Jocelyne Pitos, Isabelle Plante, Nuria Portillo Poblador, Valentin Mihai Popovici, Naomi Prinsloo, Ana Patricia Saravia Quiroz, Tasneem Qurrah, Mar Rajsombat, Alari Rammo, Anna Rao, Abraham Andriamarelaza Ratsizafy, Tatiana Reis, Pierre-Alain Richardot, Diana Stella Antonio Rojas, Sagorika Roy, Mokhalad Saab, Raghed Saab, Annette Sagri, Tommi Antero Salminen, Charya Samarakoon, Carlos Gallego Sanchez, Alexandra Sarinova, Anastasiia Semenova, Ahmed Hassan Sharafeldin, Masoud Shayganmehr, Minkyung Shin, Zafirah Singham, Kansiree Sittipoonaegkapat, Pornpilin Smithveja, Margarita Sobolev, Aleksandra Starčević, Milan Stevanovic, Bogdana Storozuk, Stilyana Stoyanova, Daniela Stratulativ, Kiia Strömmer, Jana Šulcová, Lin Sun, Zoey Sun, Dewi Gayatri Suwadji, Santeri Talka, Ea Astorga Tapia, Jathusan Tharmarasa, Claudia Torres, Thu Truong, Juan Moisés de la Serna Tuya, Alain Mukanuna Tuzza, Mario Vigil, Vincent Vukovic, Amruta Vyas, Xinyi Wang, Alexandra Warmers, Eima Waseem, Megan Wiggins, Christopher Wizda, Nindya Wulansari, Junhui Xu, Mai Yehia, Galiya Yelubayeva, Panidjugnii Yunren, Hulya Yurekli, Jawwad Zaki, Georgina Jimenez Zehnder, Vitalia Zmushko and Gabriella Zsótér.

Local Online Services Index research

The 2020 edition also engaged a number of United Nations Volunteers, staff and interns in the assessment of local e-government development by conducting a review of a select list of city portals.

These researchers included: Maria Ablameyko, Mourifie Adou, Haryanti Mohd Affandi, Aileen Agüero, Moustafa Ahmad, Tarem Ahmed, Georg Aichholzer, Adil Al-Busaidi, Umayra Al-Nabhany, Hanan Al-Saggaf, Hafedh Al-Shihi, Ali Abdallah Alalwan, Erwin Alampay, Ayman Alarabiat, Charalampos Alexopoulos, Kemi Aluko, Mahmoud Alzoubi, Prajwal Amatya, Abdulmalik Amein, Wagner Araújo, Araya Asfaw, Asomiddin Atoev, Abdalrahim Awamleh, Dany Ayida, Cenay Babaoglu, Judy Backhouse, Rehema Baguma, Elvin Balajanov, Doina Banciu, Lorena Belenky, Soumaya Ben Dhaou, Andreina Beryi Da Costa Occhipinti, Manuel Pedro Rodríguez Bolívar, Tereza Cahlikova, Iván Cantador, Joana Carvalho, Nuno Carvalho, Walter Castelnovo, Jenny Cedeño, Jenny Cedeño, Debora Cerro Fernandez, Houda Chakiri, David Chen, Guillermina Cledou, David Valle Cruz, Maria Alexandra Cunha, Martin Daniel, Abdullah Danish, Behrooz Daryabari, Wasantha Deshapriya, Victor Hugo Molina Dueñas, Débora Dutra, Derrick Elemu, Mohamed Elfateh Ahmed Ebrahim, Elsa Estevez, Abdullah Farah, Iván Galindo-Castro, Katarine Gevorgyan, Charlemagne Gomez, Rajan Gupta, Kristine Hakobyan, Karim Hamza, Ari Helin, Enrique Herrera-Viedma, Luu Tha Hu, Jiang Huang, Omar Hujran, Safaa Hussein, Hadijah Iberahim, Irma Jara Iñiguez, Arfeen Irfanullah, Georgina Jimenez Zehnder, Kansiree Jinny, Zoran Jordanoski, Eliz Kaptan, Driss Kettani, Hyejun Kim, Jitka Komarkova, Hana Kopackova, Bal Krishna, Joanna Krukowska, Diana Lasteros, Dahye Lee, Nele Leosk, Esselina Macome, Gertrudes Macueve, Mercy Makpor, John Peter Malish, Mounia Malki, Portiah Mambo, Kabira Mammadova, João Marco, Ralf Martin, João Martins, Isabella Matambanadzo, Sehl Mellouli, Isaac Mensah, Diana Mesquita, Morten Meyerhoff, Valentin Mihai Popovici, Gábor Miklós, Mihail Mistret, Yaeko Mitsumori, Marcela Morales, Conrad Mueller, Aki Nagnao, Brenda Nelly Herrera Garcia, Thomas Neururer, Chaikal Nuryakin, Mário Peixoto, Gabriela Viale Pereira, Phyu Phyu, Kerley Pires, Aminata Pitroipa, Raya Ahmada Rai, Voahangy Rakotonirina, Luis Felipe Ramos, Harilanto Raoelson, Ibrahim Rohman, Elijah Rubvuta, Alexander Ryabushko, Nasim Sadat, Muhammad Anwaar Saeed, Victor Salama, Aurora Sánchez, Rodrigo Sandoval, Ana Sandoval, Anuujin Sanjaajamts, Dimitris Sarantis, Vaibhav Shah, Jamal Shahin, Ahmad Shahsawari, William Shu, Paulo Silva, Elisabete Simões, Pornpilin Smithveja, Maddalena Sorrentino, Daniela Stratulativ, Reima Suomi, Katarzyna Szmigiel-Rawska, Kayode Taiwo, Jill Tao, Eliane Torres, Javier Torres, Victoria Vdovychenko, Hyejin Wang, Emma Winkels, Mete Yildiz, Flavio Yuaca, Moinul Zaber, and Megat Zuhairy.

(EP #20-01016)

The year 2020 witnessed a transformational change in global development as the United Nations Secretary-General António Guterres called on Member States and other stakeholders to "kickstart a decade of delivery and action for people and planet", given the short time left to achieve the 2030 Agenda for Sustainable Development.

By surveying and studying broad patterns of digital government around the world, the United Nations E-Government Survey assesses the digital government development of the 193 United Nations Member States in identifying their strengths, challenges and opportunities, as well as informing policies and strategies. The Survey supports countries' efforts to provide effective, accountable and inclusive digital services to all and to bridge the digital divides in fulfilling the principle of leaving no one behind. Since its inception in 2001 by the United Nations Department of Economic and Social Affairs, the Survey has become an indispensable ranking, mapping and measuring development tool for digital ministers, policymakers and analysts delving into comparative analysis and contemporary research on e-government.

The launch of this Survey is also taking place during unprecedented time of the COVID-19 pandemic. While the pandemic has reinvigorated the role of e-government, both in its conventional delivery of digital services as well as new innovative efforts in managing the crisis, it has also brought challenges and multiple forms of digital divides to the fore, especially among the poorest and the most vulnerable groups.

ISBN 978-92-1-123210-3

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20-07242