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Department of Economic and Social Affairs

E-Government Survey 2022

The Future of Digital Government

Department of Economic and Social Affairs

UNITED NATIONS
E-GOVERNMENT
SURVEY 2022

THE FUTURE OF DIGITAL GOVERNMENT

United Nations Department of Economic and Social Affairs

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2022 The Future of Digital Government
2020 Digital Government in the Decade of Action for Sustainable Development
2018 Gearing E-Government to support transformation towards sustainable and resilient societies
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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

Preface

The release of this 12th edition of the UN E-Government Survey in 2022 occurs at a critical moment, with only 8 years left to achieve the Sustainable Development Goals (SDGs) - the shared blueprint for every country to jointly build a better and sustainable future for all. In the meantime, the international community is facing interlinked and cascading crises with dangerous implications for peace and security, social stability, public health, climate, and our fragile ecosystems.

Against this backdrop, the 2022 Survey highlights the increasing contributions of digital transformation and digital government in accelerating the realization of the 2030 Agenda for Sustainable Development and in making sure that no one is left behind and offline in the digital age. The Survey demonstrates that digital technologies, among other things, have allowed governments to play a key role in addressing the challenges surrounding the global health crisis and in ensuring effective delivery of essential public services during a period of growing isolation, uncertainty and vulnerability.

The 2022 Survey highlights the important role that digital government tools have played the ongoing fight against the COVID-19 pandemic. Over the past two years 90 per cent of Member States have established dedicated portals, or created space in their national portals, to address issues and public services related to the pandemic. These digital government tools have proven essential. Going forward, digital government can undoubtedly help us tackle other global crises, including climate change, and prepare us to work through future shocks and risks.

The survey results in this edition also point to a remarkable improvement in telecommunications infrastructure and human capacity development and an encouraging improvement in service provision, with the global E-Government Development Index (EGDI) average having increased overall. Nonetheless, EGDI values tend to be higher for higher-income countries than for lower-income ones, and the EGDI average for least developed countries (LDCs), particularly those in Africa, is still far below the global average, underscoring gaps in e-government development and the persistence of the digital divide.

The 12th edition also marks the first study to incorporate an assessment of e-government in the most populous city in each of the 193 United Nations Member States. Despite a general digital performance gap between city portals and their national counterparts, most cities - especially more populous cities - have improved their Local Online Service Index scores by virtue of greater access to critical resources such as a highly skilled workforce, a broad knowledge and skill base, and a dedicated public budget.

Looking forward, I wish to call upon e-government leaders from all over the world to redouble their efforts including by investing more in national digital transformation, and timely adoption of a comprehensive and innovative digital government framework, so that advances in e-government are integrated with broader sustainable development initiatives, ultimately serving the wider goal of supporting the achievement of the SDGs and leaving no one behind, offline.

The 2022 UN E-Government Survey is published at a challenging time, but we find hope and inspiration in progress in digital development. Managed well, digital transformation and digital government, through inclusive application of digital technology and multistakeholder partnerships, will continue to be a powerful driver for advancing a sustainable future for all.

LI Junhua
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Acknowledgements

Contributions

The chapters of the publication were edited by Terri Lore.

Acronyms

3D	three-dimensional
4G	fourth-generation wireless technology for digital cellular networks
5G	fifth generation wireless technology for digital cellular networks
AI	artificial intelligence
AIM	Account + Identity = Mobility
API	application programming interface
ASEAN	Association of Southeast Asian Nations
CDTO	chief digital (and) technology officer
CEO	chief executive officer
CIO	chief information officer
COVID-19	Coronavirus Disease 2019
CP	content provision (OSI subindex)
DTT	digital terrestrial television
EGDI	E-Government Development Index
EMUI	Encrypted Mobile User Identity
EPI	e-participation (OSI subindex)
EPI	E-Participation Index
FDI	foreign direct investment
GB	Gigabyte(s)
GCC	Cooperation Council for the Arab States of the Gulf
GDP	gross domestic product
GDPR	General Data Protection Regulation (European Union)
GII	Gender Inequality Index
GIS	geographic information system
GNI	gross national income
GPII	Global Public Inclusive Infrastructure
GPS	Global Positioning System
HCI	Human Capital Index
HTTPS	Hypertext Transfer Protocol Secure

HV	high-very high (rating class or quartile subgroup)
ICT	information and communications technology
ID	Identification/identity
IDC	International Data Corporation
IF	institutional framework (OSI subindex)
IFC	International Finance Corporation
IoT	Internet of Things
IP	Internet Protocol
IT	information technology
ITU	International Telecommunication Union
LDC	least developed country
LEO	low Earth orbit
LGQ	Local Government Questionnaire
LLDC	landlocked developing country
LM	low-middle (rating class or quartile subgroup)
LNOB	leaving no one behind
LOSI	Local Online Services Index
M2M	machine-to-machine
MEL	monitoring, evaluation and learning
MFS	mobile financial services
MH	middle-high (rating class or quartile subgroup)
MSQ	Member States Questionnaire
NGO	non-governmental organization
NLP	natural language processing
OECD	Organization for Economic Cooperation and Development
OGD	open government data
OSI	Online Services Index
pdf	Portable Document Format
QR	Quick Response (code)

SDG	Sustainable Development Goal
SIDS	small island developing State(s)
SMS	Short Message Service
SP	services provision (OSI subindex)
STI Forum	Multi-Stakeholder Forum on Science, Technology and Innovation for the SDGs
TEC	technology (OSI subindex)
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
UNDP	United Nations Development Programme
UN-HABITAT	United Nations Human Settlements Programme
UNCRD	United Nations Centre for Regional Development
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF ECARO	United Nations Children's Fund Europe and Central Asia Regional Office
UNU-EGOV	United Nations University Operating Unit on Policy-Driven Electronic Governance
US or USA	United States of America
VAT	Value Added Tax
VH	very high (rating class or quartile subgroup)
WCAG	Web Content Accessibility Guidelines
WDI	World Development Indicator
WHO	World Health Organization
XML	Extensible Markup Language

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About the Survey

Scope and purpose

The United Nations E-Government Survey has been published biennially by the United Nations Department of Economic and Social Affairs (UN DESA) since 2001. The Survey assesses the e-government development status of all United Nations Member States and has, over this time, established a body of in-depth data sets and analysis.

The assessment measures the 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 Sustainable Development Goals (SDGs). The Survey 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. 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.

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 Information and Communications Technologies (ICTs) for development.

Starting in 2018, the Survey also assessed the select city portals of the UN Member States by utilising the same methodology with the introduction of the Local Online Service Index (LOSI). After covering 100 cities in 2020, the current edition analyses the progress of the most populous city in each country.

Structure and methodology

The Survey measures e-government effectiveness in the delivery of public services. It is composed of analytical chapters 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 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 assessment, 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 several 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 using ICTs. Similarly, the Local Online Service Index (LOSI) captures the state of the development of e-government service provision for similar features at the city level. This data is collected by a group of researchers under the supervision of UN DESA through a primary research and collection endeavour.

The *Survey*

The methodological framework has remained consistent across the Survey periods, but it should be noted that, 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. These changes are outlined in each edition of the Survey in which they are introduced. While the overarching methodological framework has not changed, these improvements may nonetheless impede full-scale comparisons with the previous editions, though for most indicators this remains possible, and historical comparisons are provided where relevant. The full changes introduced for the 2022 Survey are elaborated in annex A.

The 2022 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 and subindices; the Telecommunication Infrastructure Index and its components; and the Human Capital Index and its components. The data related to LOSI levels are also similarly presented both in this publication and online. Further comprehensive information about the methodology of the 2022 Survey is available in the Annexes.

Preparatory process of the 2022 Survey

The preparatory process of the 2022 Survey included a number of activities. An Expert Group Meeting (EGM) (held online in March 2021) was organized to allow experts in the field of digital government to exchange views on the Survey methodology. The discussions on the methodology were held in the context of current developments and trends in e-government services, digital technologies more broadly, and with an over-arching imperative of working towards achieving the 2030 Agenda and its SDGs – all vis-à-vis the challenges of the COVID-19 pandemic.

For the Online Service Index (OSI) values for 2022, a total of 227 online United Nations Volunteer (UNV) researchers from 130 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). 129 Member States (comprising 66.84% of UN membership) returned the completed questionnaires, and the appropriate submitted sites were then utilized during the verification process.

What was changed in the 2022 edition compared to 2020

To improve the methodology and take into account the lessons learned from the previous editions, the inputs and feedback received by Member States and through open consultations, the outcomes of an EGM and the latest technological and policy development, a limited number of changes were introduced in the 2022 Survey as summarized below:

- The Online Services Index (OSI) has been refined to allow government portals to be assessed on the basis of five criteria—institutional framework (IF), services provision (SP), content provision (CP), technology (TEC) and e-participation (EPI)—with the OSI as a whole calculated based on the normalized values for each subindex (see annex A). This new approach, which was partially utilized in the assessment of LOSI pilots 2018 and 2020, further aligns the OSI with LOSI formula, introduces the concept of a composite Online Service Index (similar to the TII and HCI), and supports a more nuanced analysis of government advancements

in e-government development. The 2022 OSI has been calculated based on 180 questions (up from 148 in 2020).

- The E-Participation Index (EPI) methodology has been improved to better assess engagement, including assessing: (i) government portals and websites for the integration of participatory budgeting or similar mechanisms, (ii) the availability of open government data (OGD) in general and in six key sectors linked closely to SDG implementation (education employment, environment, health, justice and social protection), (iii) evidence of co-creation or co-production mechanisms for collaborative services provision, (iv) evidence that people's voices are heard in discussions and decision-making processes linked to the formulation and adoption of policies on issues relating to vulnerable populations, and (v) evidence of online consultations (via e-forums, e-polls, e-questionnaires, or other e-participation tools) that are designed to facilitate the engagement of people in vulnerable situations.

- The Member State Questionnaire (MSQ) was expanded to cover digital inclusion matters more fully, and to address issued related to COVID-19 responses and recovery.

- The assessment of city portals has been expanded from 100 cities in 2020 to 193 in 2022 (i.e., the most populous city in each of the 193 UN Member States). The corresponding assessment criteria was reviewed and aligned with the 2022 OSI methodology with the addition of a fifth criterion – institutional framework (IF). Total number of indicators have increased to 86 in current LOSI 2022 edition, compared to 80 indicators assessed in the LOSI 2020 edition.

- The annexes have been extended with information related to pilot study initiatives covered in the Survey – Complex Network Analysis and the Open Government Data Index.

Executive Summary

Digital technology is increasingly blurring the lines between the physical, digital and biological spheres and is rapidly changing the way people live, work and communicate. The public sector is a case in point; in terms of policies, institutions, strategies and tools, there is no longer a clear distinction or separation between government and e-government.[1]

With the evolution of digital government, public administrations and institutions around the globe have been irreversibly transformed—both structurally and in terms of the dynamic between Governments and the people they serve. These observations draw from two decades of analytical research and the monitoring of trends within the framework of the United Nations E-Government Survey.

While nearly every country is engaged in the process of digitalization, not all have achieved the same level of development, and while institutions at all levels are committed to modernization and digital transformation, approaches and outcomes vary greatly. Not all countries are able to achieve the same sustainable development gains through e-government development, and the benefits to communities and vulnerable segments of the population have been disproportionate and uneven. The COVID-19 pandemic has further exposed e-government divides between and within countries at the regional, national and local levels.

The United Nations E-Government Survey, a biennial publication of the United Nations Department of Economic and Social Affairs (UN DESA), was conceived and continues to be recognized as a valuable measurement and development tool, serving as both a monitoring mechanism and a guiding framework for public sector digitalization. The twelfth edition of the Survey offers further evidence of the ongoing shift from the traditional technocratic e-government approach of the early 2000s to a digital development agenda that is policy oriented, data-centric and politically driven, and it further illustrates how e-government has expanded and evolved from siloed approaches in a handful of high-income countries to whole-of-government and whole-of-society approaches in virtually all countries around the globe. In a very real sense, digitalization is redefining and transforming the way Governments operate.

The COVID-19 pandemic has constituted a litmus test of sorts for Governments around the world. It has forced Governments to rethink the role of the State and has compelled them to develop digital solutions to ensure the continuity of public services and societal stability—often taking them outside the scope of existing policies and regulations. It has tested the responsiveness, agility and digital resilience of Governments, providing opportunities to strengthen multilevel governance across regional and local jurisdictions and to extend the provision of information and services to all segments of society, including micro, small and medium-sized enterprises and vulnerable populations, to ensure that no one is left behind in the hybrid digital society. There have been successes and setbacks, and the pace of progress has varied from one country to another, but overall e-government development trends remain positive and encouraging.

The first three chapters of the present Survey explore global, regional and local e-government trends, with development assessments based on the tested and accepted e-government development index (EGDI) methodology. The fourth chapter focuses on leaving no one behind in the hybrid digital society, highlighting the importance of e-participation and open government data. The final chapter examines key trends and innovations that are expected to drive the future of digital government for sustainable development.

Digital government has reached a critical point. It is no longer a stand-alone or auxiliary tool, nor does it represent a panacea for government deficiencies or inefficiencies; it should be seen as an integral and thoroughly integrated aspect of the physical functioning of public institutions and services delivery. Digital development is inexorable, and inaction or the wrong action can be costly (in terms of missed economic and social development opportunities) and deepen risks (in particular those linked to cybersecurity and privacy issues).

With the acceleration of e-government development and the social and economic recovery efforts being undertaken in the post-COVID period, this is an opportune time to activate the priorities highlighted by the Secretary-General in the "Roadmap for digital cooperation" and *Our Common Agenda*, strengthening inclusion, equity and engagement through the provision of anticipatory/ predictive and people-centred services and through enhanced digital cooperation with the private sector and diverse stakeholder groups. It is imperative that digital government—including e-services and e-participation—be set up in a way that strengthens rather than undermines trust in Governments and public institutions.

Global and regional trends

The global average EGDI value has risen slightly, from 0.5988 in 2020 to in 0.6102 in 2022, largely because of the progress made in strengthening telecommunications infrastructure. Europe remains

Figure ES.1   Global and regional EGDI averages, country groupings by EGDI levels, and online services provision in selected sectors, 2020 and 2022
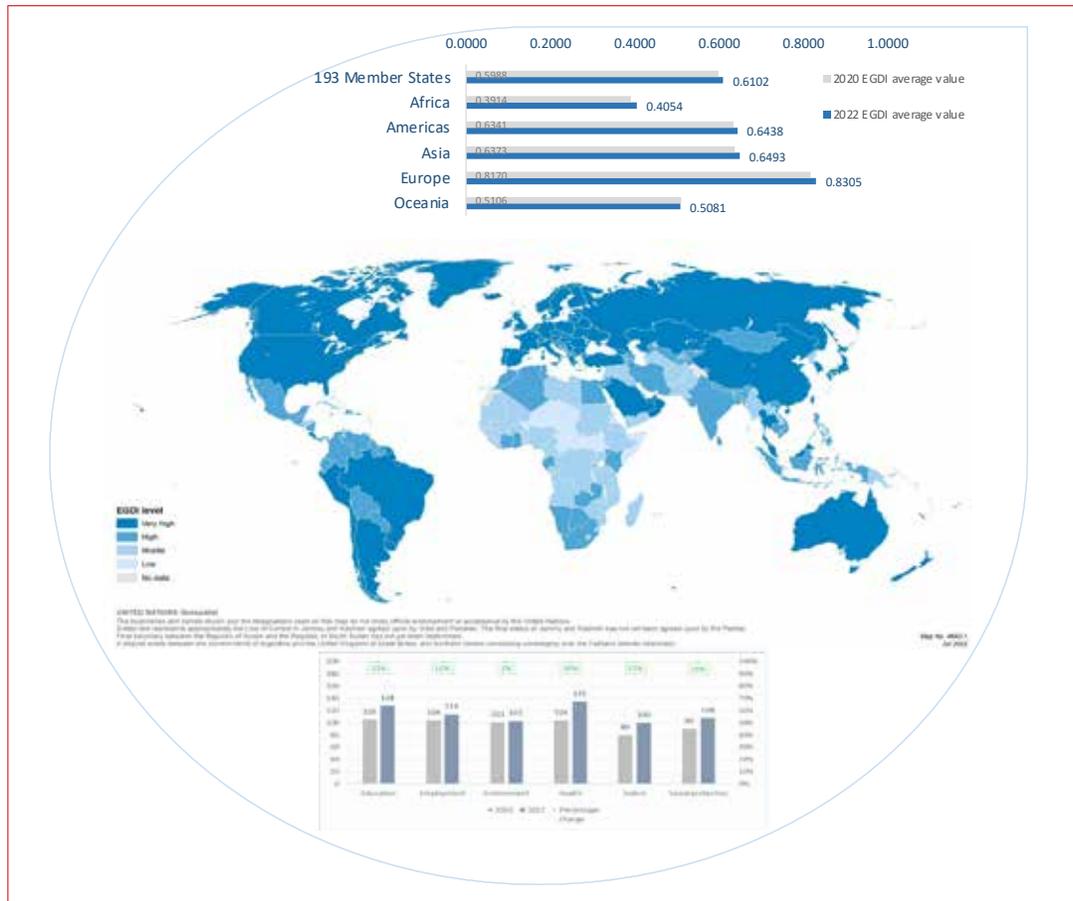
Source: 2022 and 2020 United Nations E-Government Surveys.

the leader in e-government development, with an average EGDI value of 0.8305, followed by Asia (0.6493), the Americas (0.6438), Oceania (0.5081) and Africa (0.4054). For the first time since 2016, the average EDGI value for Oceania has declined, largely owing to the 29 per cent drop in the average Telecommunications Infrastructure Index (TII) value for the region over the past two years. The first two chapters of the Survey review the progress achieved in global and regional e-government development, highlighting areas of improvement and challenges faced by Member States during the assessment period.

Despite the increasingly widespread reliance on digital technologies for services delivery during the COVID-19 pandemic, comprehensive digital transformation in the public sector has not yet materialized. For most of the world, government priorities in online services provision have centred on health, education and social protection. The most significant increase has been in the number of countries offering services that allow users to apply for social protection programmes and benefits such as maternity care, child subsidies, pensions, and housing and food allowances.

A total of 22 online services have been assessed for the 2022 Survey, and in regional terms, Europe has the highest average number of services offered online (19), followed by Asia (17), the Americas (16), and Oceania and Africa (12 each).

Populations traditionally identified as vulnerable—people living in poverty, persons with disabilities, older individuals, immigrants, women, and youth—have benefited from the progress achieved, though additional efforts are needed to ensure that no one is left behind in e-government and the broader process of digitalization.

A growing number of countries have strengthened their institutional and legal frameworks for e-government development. Most countries have a national electronic or digital government strategy, as well as legislation on cybersecurity, personal data protection, national data policy, open government data, and e-participation. Individuals and businesses are increasingly able to interact with public institutions through online platforms, obtain information on legislation relating to freedom of information, and access public content and data.

While digital government development trends indicate steady growth and improvement, with notable progress achieved in a number of areas, there are significant challenges that still require attention. The pandemic has exacerbated digital divides. There are presently more than 3 billion people living in countries that have EGDI values below the global average, with most of these countries concentrated in Africa, Asia and Oceania. Only 4 of the 54 countries in Africa have EGDI values above the global average (0.6102); the others have EGDI values that are sometimes significantly lower. A number of countries in Africa have improved their telecommunications infrastructure, helping them build a solid foundation for accelerating the transition to digital government; however, e-government development efforts are undermined by the fact that the cost of mobile broadband subscriptions as a percentage of per capita gross national income remains significantly higher in Africa than in other parts of the world. This is but one example of the myriad challenges that make it difficult for countries to narrow gaps in e-government development and bridge digital divides. Without the adoption of targeted and systematic measures to assist low-income and lower-middle-income countries and countries in special situations—including least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing States (SIDS)—digital divides are likely to persist and may even widen.

Local e-government

Our Common Agenda and the Sustainable Development Goals affirm the key role cities play in driving national and global change and improving people's lives. Within the present Survey framework, the Local Online Services Index (LOSI) assesses progress made in local e-government development over a two-year period.

The first pilot study on local e-government was carried out in 2018, and coverage has been expanded and enriched in successive editions of the Survey. In the 2022 LOSI study, the most populous city in each of the 193 United Nations Member States has been assessed, and a new criterion (institutional framework) has been introduced to facilitate alignment with the Survey's Online Services Index.

Chapter 3 offers a detailed analysis of city portals based on 86 LOSI indicators relating to five criteria and on the results of the most recent Local Government Questionnaire. Key LOSI findings are as follows:

- The average LOSI value increased from 0.43 in 2020 to 0.51 in 2022.
- In 2022, as in 2020, city portals do not perform as well as their national counterparts (see figure ES.2 below).
- The more populous cities tend to have higher overall LOSI values; this correlation may derive from the greater access such cities generally have to important resources.
- Among cities with reasonable levels of wealth, there is not necessarily a direct correspondence between GDP per capita and LOSI values.

Figure ES.2   Comparison of city portals and nations portals' performance
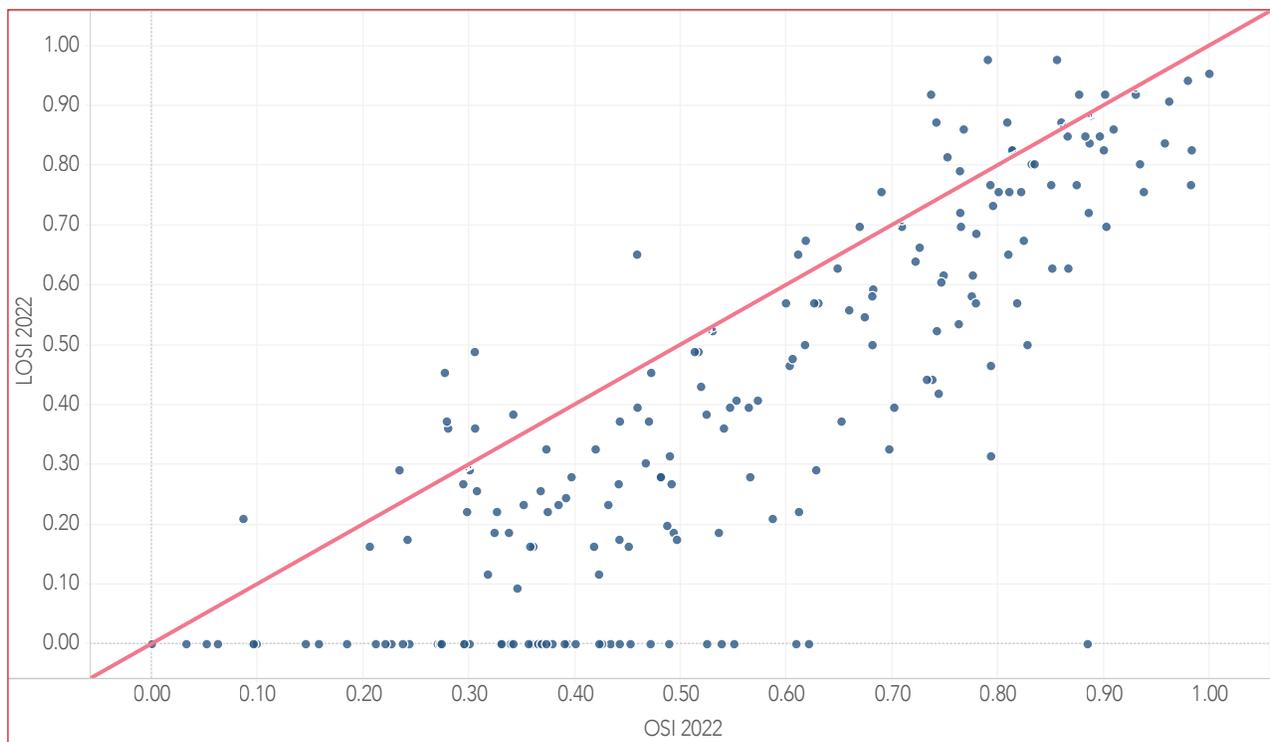
The chapter analysis indicates that a well-formulated local e-government strategy can facilitate and strengthen sustainable local administration, the integration of new technologies, the ability to address public sector challenges such as those linked to the pandemic, and the realization of the 2030 Agenda.

Resource constraints limited the number of cities that could be included in the formal LOSI assessment for the Survey. However, there has been strong interest in the LOSI approach among other stakeholders; UN DESA has answered this need by arranging to run LOSI pilots in multiple cities in selected countries, and academics have undertaken independent studies using the LOSI methodology. Governments are encouraged to become part of the LOSI network so that municipal authorities can work together to strengthen e-government at the level closest to the population they serve.

Leaving no one behind in the hybrid digital society

While important advances have been made in e-government over the past two decades, inclusive design has not received sufficient attention. The groups easiest to reach have generally benefited most from the notable progress in e-government, while many of the poorest and most vulnerable populations have been left behind.

As Governments continue to transition from traditional to digital modes of public services delivery, those e-services that are not designed to facilitate inclusion will likely be underutilized by vulnerable groups, effectively denying them the rights and opportunities enjoyed by more advantaged populations in the hybrid digital society.

Even before the COVID-19 pandemic, widening socioeconomic inequalities were exacerbated by digital gaps; the accelerated public sector digitalization that has occurred in response to the recent global health crisis has simply magnified this trend. There is still insufficient understanding of how the design and implementation of e-government initiatives affect people of different genders, ages, capabilities and income levels and what needs to be done to address exclusion and discrimination. A key factor contributing to the uncertainty is that digital divides are not static; vulnerability is a dynamic and shifting state, and a list of risk factors is not always sufficient to identify those who need different ways to access and utilize services.

Very few countries show evidence of having engaged in online consultations involving vulnerable groups, and even fewer countries have evidence showing that user input has been considered or incorporated in policy decisions on issues relating to vulnerable groups.

Designing for inclusion, including e-inclusion, is critical for leaving no one behind. An important precondition is recognizing that exclusion exists—largely because perceptions and solutions are driven by biases rather than by objective, data-driven evidence.

Proactive efforts are needed to acknowledge and identify the gaps, to provide vulnerable populations with mechanisms for engagement so that the types and origins of discrimination are better understood, and to then use what has been learned to develop responsive e-government and improve the lives of those who are hardest to reach.

Figure ES.3 offers a graphic representation of an integrated framework for developing inclusive e-government. The first step is to identify barriers to digital inclusion relating to access, affordability and ability. The second step is to develop a targeted implementation strategy for leaving no one behind that is grounded in data, design and delivery optimization.

Figure ES.3 An integrated framework for e-government: strengthening data, design and delivery (enablers) to address barriers relating to access, affordability and ability
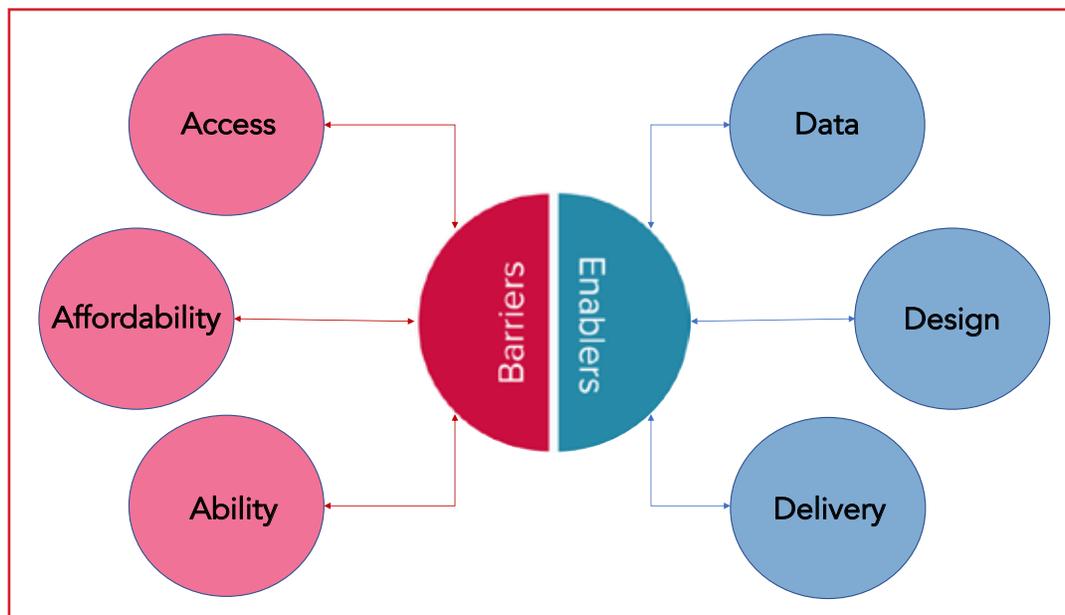
Source: Author's elaboration, based on Internet Society, "Digital accessibility", Issue Paper: Asia-Pacific Bureau (May 2017) and other sources. For a more detailed version of this graphic, see figure 4.17 in chapter 4 of the present publication.

Chapter 4 of the Survey explores the challenges and opportunities associated with efforts to ensure that no one is left behind. It is recommended that "leaving no one behind" become the operational principle guiding policy development and implementation in e-government and the public sector. At the policy and regulatory level, Governments should adopt "inclusion by design", "inclusion by default" or "inclusion first" strategies to counter the global trend towards the adoption of digital-by-default, digital-first, invisible-government and one-stop-shop strategies; targeted, localized and contextual approaches are key, as not all excluded groups are confronted with the same barriers or are affected to the same extent. The global community can contribute to leaving no country behind in digital government through knowledge exchange, strategic partnerships and collaborative capacity-building.

One of the key lessons learned during the COVID-19 pandemic is that the future is hybrid and not digital; the primary objective is not digital development but rather recognizing human agency and supporting human development through digitalization. An inclusive, integrated digital/analogue ecosystem is needed to facilitate and sustain inclusive e-government development so that everyone benefits and no one is left behind.

The future of digital government

Chapter 5 focuses on digitalization trends, highlighting the challenges that continue to undermine development efforts and offering observations and forecasts on the future of digital government.

The path to digital inclusion and sustainable development remains fraught with obstacles and uncertainties, especially in Africa and among LDCs and SIDS. For many developing countries and countries in special situations, comprehensive digitalization represents a massive, complex challenge.

Pursuing digital transformation without the appropriate institutional support, funds, regulations, policies and strategies can lead to job losses, increased inequality, and data privacy and security issues.

Using the global average EGDI value as a proxy for measuring the digital divide, the 2022 Survey indicates that about 45 per cent of the combined population of the United Nations Member States (3.5 billion people) still lag behind. In Africa, 50 out of 54 countries (home to 95 per cent of the region's population) have EGDI values below the global average, and the same is true for 11 of the 12 SIDS in Oceania.

Figure ES.4   Population living in countries with EGDI values above and below the world average (Thousands)
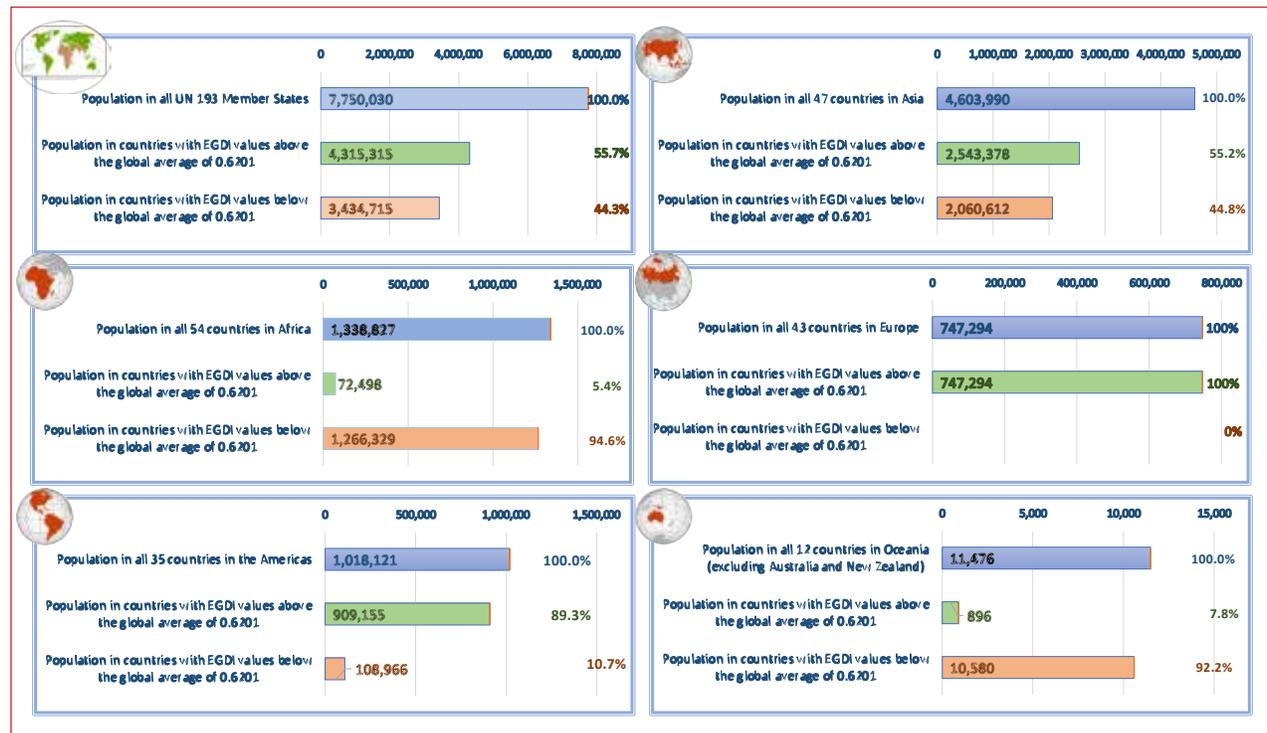
Source: 2022 United Nations E-Government Survey; United Nations population data.

The private sector has been at the forefront of the digital transformation for a number of years, and the COVID-19 pandemic has greatly accelerated developments in this area, compelling industries and companies to adopt new digital technologies to improve services delivery and increase productivity in an effort to adapt to the changes forced on them by the urgent health crisis. The acceleration of digitalization in the private sector has raised people's expectations for more effective public services delivery. The pandemic has reinforced the need for the public sector to catch up with the private sector in terms of attracting talent and updating personnel skills. During the past couple of years, Governments have been forced to become more innovative, resourceful, and effective and to contribute more strategically and proactively to the digital transformation in support of building a sustainable and digitally resilient society.

The 2022 Survey results indicate that a growing number of countries are moving towards seamless, invisible government in which fully automated and personalized services are made accessible to anyone anytime from anywhere. More Governments are deploying cutting-edge technologies such as cloud computing, artificial intelligence and blockchain to assess and address the needs of constituents. Some have developed new methods for exploiting data-driven policy modelling tools and have created pilot initiatives and sandboxes to design, validate and scale up innovative solutions. These approaches are allowing Governments to strengthen their analytical and anticipatory capabilities and proactively shape future development scenarios. With the increased focus on cognitive government, agile and adaptive government, and the development of predictive capabilities, Governments are setting themselves up to better anticipate and respond to the needs of all members of society. These exciting innovations and the broader digital transformation must aim to be truly inclusive. Advances in e-government development can widen digital divides if action is not taken to ensure access for all. In digital government, it is critical that innovation be focused on human development, carrying people forward rather than leaving them behind.

Endnotes

[1] In this edition of the Survey, as in the previous edition, "e-government" and "digital government" are used interchangeably, as there is still no formal distinction made between the terms among academics, policymakers and practitioners

1. Global Trends in E-Government

1.1 Introduction

Digital technologies played an indispensable role in holding civil society together as the COVID-19 pandemic emerged, supporting the provision of basic public services and fundamental services in the health, education, and safety and security sectors as in-person access to such services grew increasingly limited. The pandemic has amplified the importance of e-government and digital technologies as essential tools for communication and collaboration between policy makers, the private sector and societies across the globe. Digital technologies contribute to national and local development, facilitate the sharing of knowledge and guidance, and enable the provision of online services and solutions in both ordinary and extraordinary circumstances, making the transition towards digital transformation inevitable. E-government has become the cornerstone for building effective, accountable, resilient and inclusive institutions at all levels, as called for in Sustainable Development Goal (SDG) 16, and for strengthening the implementation of Goal 17.

This chapter presents a data-driven analysis of key trends in e-government development in 2022 based on the assessment of the E-Government Development Index (EGDI). It also describes and analyses global trends in electronic and mobile services 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 2022, for the first time, the Online Services Index component of the EGDI is broken down into five subcategories. This added specificity allows a more detailed and nuanced assessment of online services provision and enables Member States to better target their efforts to improve overall e-government development.

The analysis is further supplemented by the findings of a pilot study UN DESA conducted in 2021 with a complex network analysis methodology (see annex A) that uses more than 500 development indicators, including SDG indicators and EGDI data, to establish digital development patterns and the clustering of countries around similar characteristics.

EGDI methodology: continuous improvement

The EGDI is a composite benchmark of e-government development consisting of the weighted average of three independent component indices: the Online Services Index (OSI), the Telecommunications Infrastructure Index (TII), and the Human Capital Index (HCI). The

Photo credit: pixabay.com

methodologies used for data collection and for the computation of the EGDI and its subcomponent values are detailed in annex A of the Survey. The OSI component has been refined to allow government portals to be assessed on the basis of five subindices—institutional framework (IF), services provision (SP), content provision (CP), technology (TEC) and e-participation (EPI)—with the OSI as a whole calculated based on the normalized values for each subindex (see annex A). This new approach further aligns the OSI with the LOSI formula, introduces the concept of a composite Online Service Index (similar to the TII and HCI), and supports a more nuanced analysis of advancements in e-government development. For the 2022 edition of the Survey, the OSI has been calculated based on 180 questions (up from 148 in 2020).

1.2   E-government rankings in 2022

The first United Nations E-Government Survey was published in 2001. The 2022 Survey is the eleventh edition of a biennial publication dedicated to tracking the global development of e-government in all United Nations Member States. Recent trends in e-government development are presented based on the assessment of values reflected in the EGDI, a normalized composite index comprising the OSI, TII and HCI. Each of the latter three indices 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 every 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 2022 Survey are elaborated in annex A. While the overarching methodological framework has not changed, these improvements 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.

The sections below present the 2022 Survey findings by EGDI rankings at the global level. Where relevant, additional insights are provided based on comparisons of data from the 2018 and 2020 Surveys. The analysis focuses on relevant correlations between the EGDI and its components, country income group classifications, advancements in e-services provision, and trends in electronic and mobile services 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. The analysis is further enriched by the comparison of EGDI groups and respective clusters of countries grouped through complex network analysis (see annex B), drawing on over 500 indicators. Where warranted, the Survey highlights similarities and differences between the EGDI groups and country clusters, as well as within specific EGDI rating class/quartile subgroups.

1.3   E-government development at a glance

1.3.1   Overall EGDI results

The 2022 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, 60 countries have very high EGDI values ranging from 0.75 to 1.00,[1] in comparison with 57 countries in 2020—a 5.3 per cent increase for this group. A total of 73 countries have high EGDI values of 0.50 to 0.75, and 53 countries are part of the middle EGDI group with values between 0.25 and 0.50. Seven countries (one less than in 2020) have low EGDI values (0.00 to 0.25).

The map in figure 1.1 shows the geographical distribution of the four EGDI groups in 2022.

Figure 1.1   Geographical distribution of the four EGDI groups, 2022

EGDI level
- Very high
- High
- Middle
- Low
- No data

UNITED NATIONS Geospatial
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the Parties.
Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.
A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

Map No. 4642.1
Jul 2022

Source: 2022 United Nations E-Government Survey.

Figure 1.2 shows the respective numbers and percentages of countries in different EGDI groups in 2020 and 2022 for comparative purposes. The results for 2022 indicate that Member States with high EGDI values make up the largest share (38 per cent), followed by those with very high EGDI values (31 per cent) and middle EGDI values (27 per cent). The share of countries with low EGDI values remains almost the same as in 2020 (4 per cent), though the actual number fell from eight to seven.

Figure 1.2 Number and proportion of countries within each EGDI grouping, 2020 and 2022

2020

Low EGDI; 8; 4%
Very high EGDI; 57; 29%
Middle EGDI; 59; 31%
High EGDI; 69; 36%

■ Very high EGDI ■ High EGDI ■ Middle EGDI ■ Low EGDI

2022

Low EGDI; 7; 4%
Very high EGDI; 60; 31%
Middle EGDI; 53; 27%
High EGDI; 73; 38%

■ Very high EGDI ■ High EGDI ■ Middle EGDI ■ Low EGDI
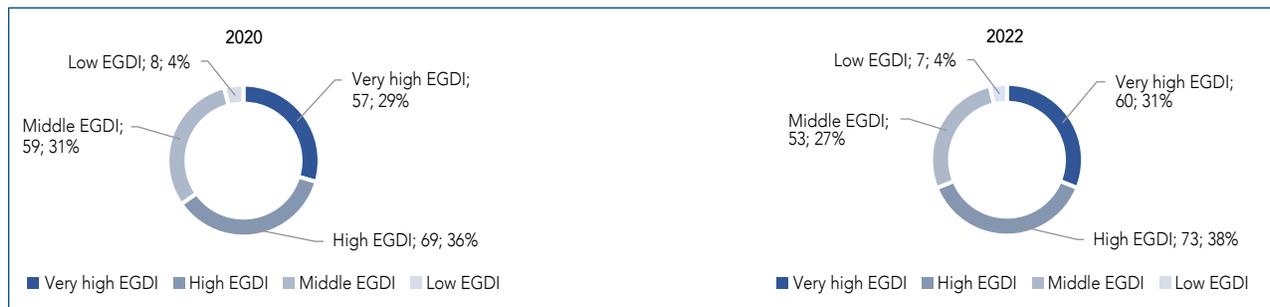
Source: 2022 United Nations E-Government Survey.

Between 2020 and 2022, the global average EGDI value rose from 0.5988 to 0.6102 and average HCI and TII values increased by 2 and 5 per cent, respectively, while the OSI average experienced a slight dip, declining from 0.5620 to 0.5554 (see figure 1.3). It is important to note that this change in the OSI could be attributed to the updated survey methodology.

Figure 1.3 Average values for the EGDI and its component indices, 2020 and 2022
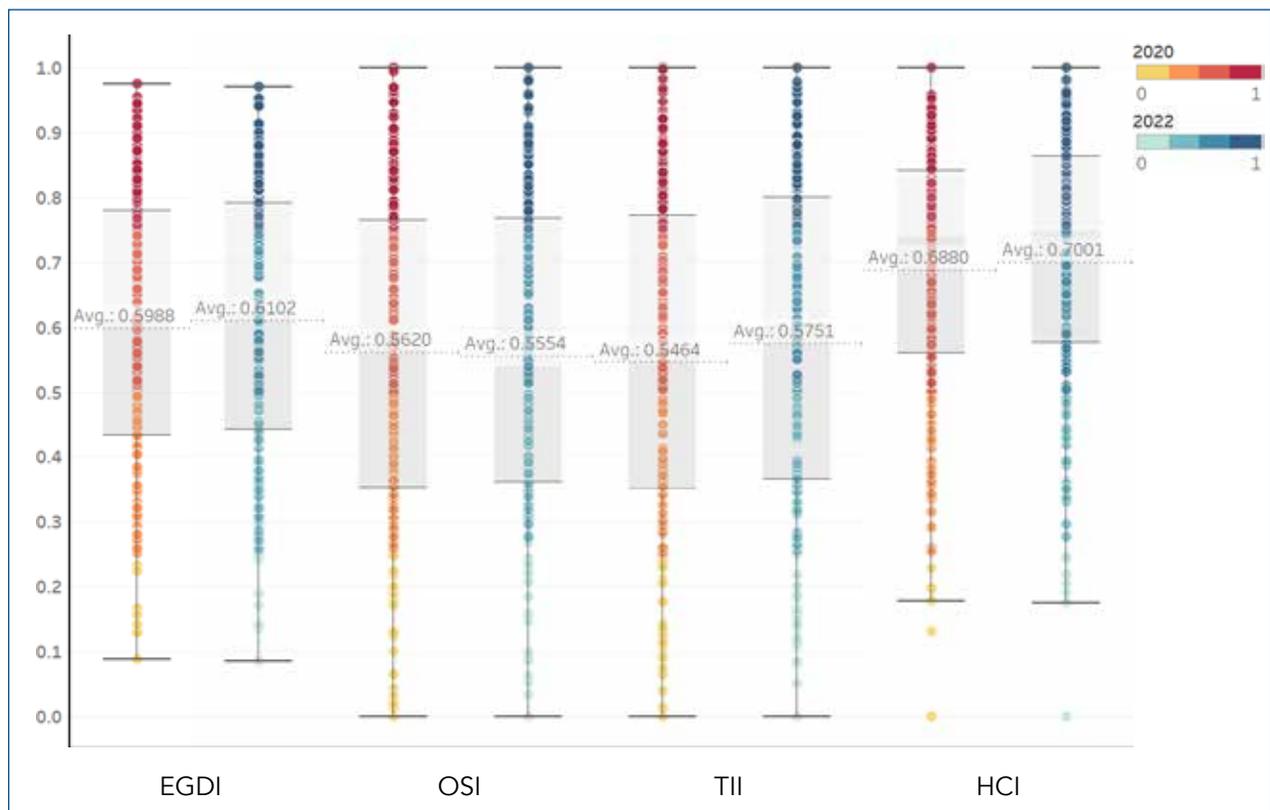
Sources: 2020 and 2022 United Nations E-Government Surveys.

In regional terms, Europe has the highest average EGDI value (0.8305), followed by Asia (0.6493), the Americas (0.6438), Oceania (0.5081), and Africa (0.4054) (see figure 1.4).

Figure 1.4   Global and regional EGDI averages, 2022
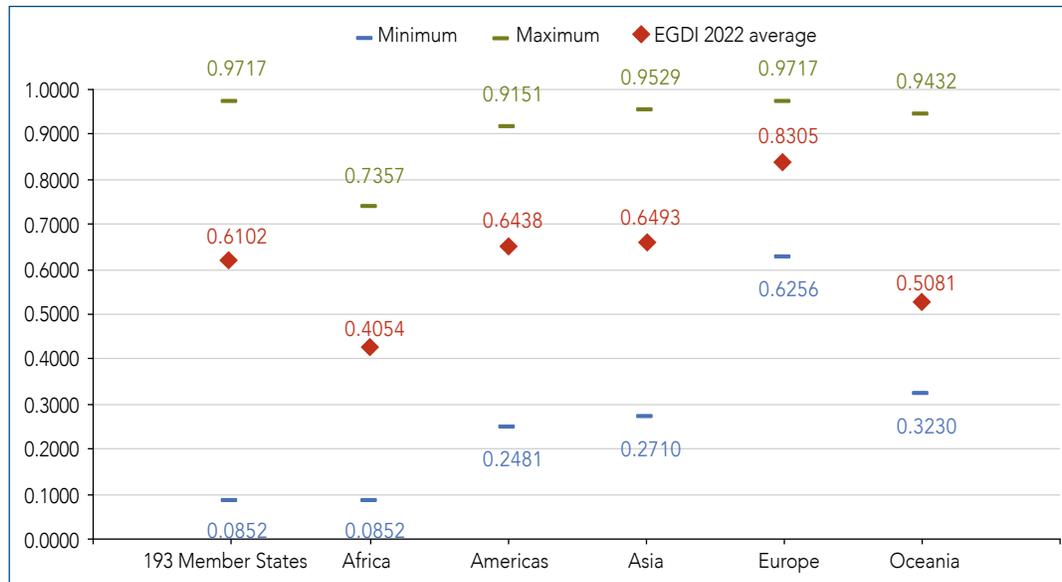
Source: 2022 United Nations E-Government Survey.

1.3.2   Country EGDI levels and quartile classifications

The subsections below focus on the distribution of countries among the very high, high, middle and low EGDI groups and highlight any changes in levels or classifications since 2020. To gain better insight into the situation of subgroups of countries with similar levels of performance within their respective EGDI groups, each EGDI group is further divided into four equally defined rating classes, or quartiles.[2] The rating class breakdowns within the respective EGDI groups, in descending order, are as follows: VH, V3, V2 and V1 for the very high group; HV, H3, H2 and H1 for the high group; MH, M3, M2 and M1 for the middle group; and LM, L3, L2 and L1 for the low group.

Very high EGDI group

The number of Member States in the very high EGDI group (with values ranging from 0.75 to 1.00) rose from 57 to 60, representing a 5 per cent increase between 2020 and 2022. These 60 countries are equally distributed between the VH, V3, V2 and V1 rating classes.

Malta and the United Arab Emirates moved from the V3 to the VH rating class in the very high EGDI group. Four countries (Georgia, Peru, Serbia and Ukraine) moved from the high to the very high EGDI group, with Serbia jumping two intervals (HV to V2).

The 15 countries in the highest (VH) rating class within the very high EGDI group are the leading countries in terms of the 2022 Survey results, with values ranging between 0.8943 and 0.9717. Ranked from highest to lowest within the subgroup, these countries include Denmark, Finland, Republic of Korea, New Zealand, Sweden, Iceland, Australia, Estonia, Netherlands, United States of America (hereinafter referred to as the United States), United Kingdom of Great Britain and Northern Ireland (hereinafter referred to as the United Kingdom), Singapore, United Arab Emirates, Japan and Malta.

At the regional level, 35 of the 60 countries in the very high EGDI group are in Europe, 15 are in Asia, 8 are in the Americas, and 2 are in Oceania.

High EGDI group

The total number of countries in the high EGDI group rose from 69 to 73 between 2020 and 2022. Eight countries have joined the high EGDI group for the first time; three are in Africa (Côte d'Ivoire, Rwanda and Zambia), two are in the Americas (Belize and Guyana), and three are in Asia (Lebanon, Nepal and Tajikistan).

Six of the eight countries in the high EGDI group 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), signifying the notable progress made 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 35 to 41 (or by 15 per cent) between 2020 and 2022; one of the latter is a low-income country (Rwanda) and twelve are lower-middle-income countries (Bangladesh, Belize, Bhutan, Plurinational State of Bolivia, Cabo Verde, Cambodia, Kyrgyzstan, Mongolia, Nepal, Tajikistan, Uzbekistan and Zambia). Groups of countries in special situations are further analysed in chapter 2.

At the regional level, 24 of the 73 countries in the high EGDI group are in the Americas, 22 are in Asia, 16 are in Africa, 8 are in Europe, and 3 are in Oceania. Eighteen of these countries are in the top HV rating class of the high EGDI subgroup, with 39 per cent of the 18 being countries in special situations (LLDCs or SIDS).

Middle EGDI group

The number of countries in the middle EGDI group (with values ranging from 0.25 to 0.50) decreased from 59 in 2020 to 53 in 2022; this decline is positive, given that eight countries moved up to the high EGDI group and two countries shifted from the low to the middle EGDI group during this period (see figure 1.5). Only one country moved down from the high to the middle EGDI group.

Africa has the largest share of countries in the middle EGDI group (60 per cent, or a total of 32 countries), followed by Asia (19 per cent, or 10 countries), Oceania (17 per cent, or 9 countries) and the Americas (4 per cent, or 2 countries).

The overwhelming majority of countries in the middle EGDI group—43 out of 53, or 81 per cent— are countries in special situations (LDCs, LLDCs and/or SIDS). Among these 53 countries, 20 (38 per cent) are low-income economies (16 in Africa and 4 in Asia), and another 25 (47 per cent) are lower-middle-income economies (14 in Africa, 6 in Oceania, 4 in Asia and 1 in the Americas). Seven countries (2 in Oceania, 2 in Africa, 2 in Asia and 1 in the Americas) are upper-middle-income economies, and one country, Nauru, is a high-income country in Oceania.

Low EGDI group

The number of countries with low EGDI values (below 0.25) dropped from eight in 2020 to seven in 2022. All of the countries in this group are LDCs and/or LLDCs; six are in Africa (Central African

Republic, Chad, Eritrea, Niger, Somalia and South Sudan) and were also in the low EGDI group in 2020, while one is an LDC in the Americas (Haiti). Guinea-Bissau and the Democratic People's Republic of Korea are the only two countries that moved up from the low to the middle EGDI group in 2022.

Regional trends and findings for all EGDI groups are explored in greater detail in chapter 2.

1.3.3   Movement between EGDI groups

The 2022 Survey results affirm the continuation of the positive global trend towards higher levels of e-government development. Figure 1.5 shows the number of countries that have moved from one EGDI group to another since 2020. Fourteen countries moved to higher EGDI groups (2 from the low to the middle group, 8 from the middle to the high group, and 4 from the high to the very high group), and three countries moved to lower EGDI groups (1 from the very high to the high group, 1 from the high to the middle group, and 1 from the middle to the low group). While these changes are positive overall, the net number of countries in each EGDI group is comparable to the numbers in 2020.

As noted earlier, each EGDI group is also divided into four equally defined quartile subgroups or rating classes. As figure 1.5 illustrates, the upward movement of countries between EGDI groups usually involves a shift from the top rating class of one EGDI group to the lowest rating class of the next highest group; with downward movement, countries typically move from the lowest rating class of one EGDI group to the highest rating class of the next lower group. This single-interval shift occurred for 15 of the 17 countries that moved to another EGDI group in 2022; Serbia and Zambia, however, were able to move up by two rating classes in their advancement to a higher EGDI level.

Figure 1.5   Movement between EGDI groups from 2020 to 2022
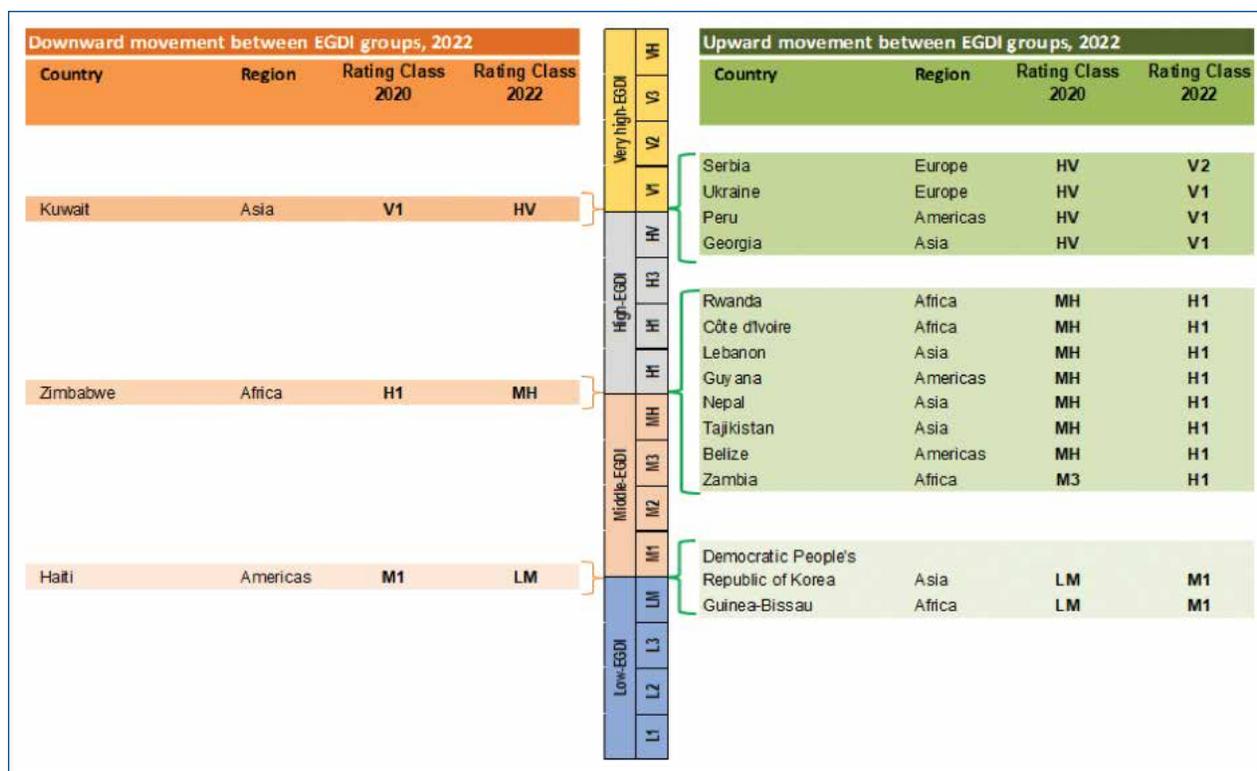
Source: 2020 and 2022 United Nations E-Government Surveys.

1.4   The countries leading in e-government development

In reviewing and analysing the 2022 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 value has underperformed during the specific two-year Survey period. Nor does a higher EGDI value signify better performance, especially among countries within the same subgroup. 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 15 countries in the highest (VH) rating class of the very high EGDI group are listed in table 1.1, which also provides the corresponding OSI, TII, HCI and overall EGDI values.

Table 1.1   Leading countries in e-government development, 2022

Country name	Rating class	Region	OSI	HCI	TII	EGDI (2022)	EGDI (2020)
Denmark	VH	Europe	0.9797	0.9559	0.9795	0.9717	0.9758
Finland	VH	Europe	0.9833	0.9640	0.9127	0.9533	0.9452
Republic of Korea	VH	Asia	0.9826	0.9087	0.9674	0.9529	0.9560
New Zealand	VH	Oceania	0.9579	0.9823	0.8896	0.9432	0.9339
Sweden	VH	Europe	0.9002	0.9649	0.9580	0.9410	0.9365
Iceland	VH	Europe	0.8867	0.9657	0.9705	0.9410	0.9101
Australia	VH	Oceania	0.9380	1.0000	0.8836	0.9405	0.9432
Estonia	VH	Europe	1.0000	0.9231	0.8949	0.9393	0.9473
Netherlands	VH	Europe	0.9026	0.9506	0.9620	0.9384	0.9228
United States of America	VH	Americas	0.9304	0.9276	0.8874	0.9151	0.9297
United Kingdom of Great Britain and Northern Ireland	VH	Europe	0.8859	0.9369	0.9186	0.9138	0.9358
Singapore	VH	Asia	0.9620	0.9021	0.8758	0.9133	0.9150
United Arab Emirates	VH	Asia	0.9014	0.8711	0.9306	0.9010	0.8555
Japan	VH	Asia	0.9094	0.8765	0.9147	0.9002	0.8989
Malta	VH	Europe	0.8849	0.8734	0.9245	0.8943	0.8547

Sources: 2020 and 2022 United Nations E-Government Surveys.

The group of countries in the highest (VH) rating class of the very high EGDI group is almost identical to the corresponding group in the previous edition of the Survey; there has been a slight net increase (from 14 to 15 countries), with Malta and the United Arab Emirates joining this group and Norway moving down to the V3 rating class. The top 15 countries are exclusively high-income countries.

Denmark has the highest EGDI value globally for the third consecutive Survey and is one of eight countries in Europe and one of six countries in the European Union that are part of the highest (VH) rating class. Malta is the only country in Southern Europe joining this subgroup in 2022, having improved in all three subindices (OSI, TII and HCI) by an average of 4.6 per cent since 2020. The most significant increases in subindex values were achieved by Sweden (a 10 per cent increase for the OSI), the Netherlands (a 4.4 per cent increase for the TII), and the United Arab Emirates (a 19 per cent increase for the HCI).

Europe accounts for 53 per cent of the VH rating class (Denmark, Estonia, Finland, Iceland, Malta, Netherlands, Sweden and United Kingdom), Asia accounts for 27 per cent (Japan, Republic of Korea, Singapore and United Arab Emirates), Oceania accounts for 13 per cent (Australia and New Zealand), and the Americas, with one country (United States), accounts for the remaining 7 per cent.

As in the past three editions of the Survey, Australia and New Zealand lead e-government development in Oceania, the United States leads in the Americas, and the Republic of Korea is the top EGDI performer in Asia, followed by Singapore and Japan. None of the countries in Africa are included in the VH rating class.

The remainder of this subsection reviews key findings on e-government development in the leading countries based on their responses to the United Nations Member States Questionnaires (MSQs), EGDI disaggregated data analysis, desk research and literature review. With outreach to 193 United Nations Member States and a global response rate of nearly 70 per cent, the MSQ remains one of the most robust measures of self-assessed e-government development worldwide. It focuses on strategic areas of digital policies aimed at developing effective, accountable and inclusive public institutions and collects information on countries' institutional, legal and strategic frameworks.

All of the leading countries responded to the MSQ (see figure 1.6), with the exception of the United States, for which additional desk research was undertaken by the Survey data team. The 2022 findings confirm those highlighted in the 2020 Survey, indicating consistency and steady progress in the digital transformation journey and the ability of Governments to do more than just manage external ICT vendors. These countries have built the capacity to create products and develop platforms; guided by strategic digital policies, they have established a core infrastructure of shared digital systems, technologies, processes and organizational models that have provided a strong but flexible framework for the development and delivery of data-driven user-centric government services.

For these countries, the whole-of-government approach has been strongly institutionalized through a central body such as a department, ministry or agency led by a high-ranking government officer—such as a national chief information officer (CIO) or chief digital technology officer—that is in charge of a multi-year digital agenda and reports to the cabinet of the president or the prime minister. This central body contributes to policy formulation and coordinates policy implementation for the Government and has wide-ranging responsibilities relating to digital services for e-government applications, data science and artificial intelligence, traditional and cloud infrastructure, cybersecurity, the Internet of things, and much more. The leading Governments engage in policy, regulatory and technology experimentation and sandboxing to test, develop and adapt cutting-edge technologies for use in e-services provision and smart city development.

This group leads the pack in providing specialized portals for e-services, e-participation, open government data and public procurement.

The MSQ responses indicate that the leading countries have specialized legislation or regulations pertaining to digital procurement, digital identity and digital signatures; the legal framework also addresses data sharing, interoperability across public agencies, and access to information such as government expenditures. All of the countries have pending or active strategic initiatives to promote the use of emerging technologies in e-government.

Figure 1.6   Member States Questionnaires: key findings for the top EGDI performers* (number of countries responding positively to the questions)

Institutional framework

Does the country have a chief information officer (CIO) or equivalent to manage its national e-government strategies and programmes? 14

Are there multiple and/or networked CIOs or equivalent positions across government agencies, departments and ministries? 8

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

Strategy and implementation

Is there a national e-government strategy or equivalent? 14

Is the national e-government strategy guided by or aligned with the national development strategy? 12

Does the national e-government strategy make specific reference to e-participation, engagement and digital inclusion? 11

Does the national e-government strategy make specific reference to the use of new technologies (such as AI, robotics, blockchain, 5G and Internet of Things)? 11

Does the national e-government strategy make specific reference to digital-by-default, digital-by-design, digital-first or similar principles? 11

Does the national e-government strategy make specific reference to national digital identity? 11

Is the national e-government strategy guided by or aligned with the Sustainable Development Goals (SDGs)? 11

Does the national e-government strategy make specific reference to data-once-only or similar principles? 10

Does the national e-government strategy make specific reference to a national data governance or similar framework? 10

Does the national e-government strategy make specific reference to or is it aligned with a sub-national or local e-government development strategy? 10

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

Future of digital government

Does the Government have any measure for policy experimentation and/or regulatory sandboxes in using digital technologies? 10

Does the Government use any foresight tools, such as scenario planning, in visioning the future of digital government? 8

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

Legal framework

Is there any legislation, law or regulation on digital signature? 14

Is there any legislation, law or regulation on digital identity? 14

Is there any legislation, law or regulation on data privacy and/or protection? 14

Is there any legislation, law or regulation on e-procurement? 13

Is there any legislation, law or regulation on cybersecurity? 13

Is there any legislation, law or regulation on access to information such as Freedom of Information Act? 13

Is there any legislation, law or regulation on open government data? 11

Is there any legislation, law or regulation on data sharing, exchange, or interoperability across government agencies? 11

Is there any legislation, law or regulation on digitally publishing government expenditure? 11

Is there any legislation, law or regulation on the use of new technologies such as artificial intelligence (AI), robotics, blockchain, 5G and Internet of Things (IoT)? 9

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

Figure 1.6   *(continued)*

Measures to leave no one behind

Does the government use any social media platform(s)? 14

Is there a national policy, strategy or similar measure in ensuring digital inclusion and leaving no one behind? 14

Does the government publish information on how people's voices, including those among women and the vulnerable populations, are included in policy decision-making? 13

Does the government provide any specific measure to build digital literacy or skills for women and other vulnerable populations? 13

Does the government provide any specific e-services for women and other vulnerable populations? 12

Does the government provide any specific measure to ensure meaningful connectivity or access to e-government services for women and other vulnerable populations? 12

Is there a national e-participation policy, strategy or similar instrument? 12

Does the government provide any specific e-participation measures for women and other vulnerable populations? 11

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

COVID-19 response measures

Is there a specific national portal or a dedicated section addressing the COVID-19 pandemic? 14

Is there a specific post-COVID-19 digital strategy for recovery and allocation of public resources (for example, for digital transformation, digital inclusion)? 11

Is there any specific budget allocated for new initiative or measure of e-government in response to the COVID-19 pandemic and/or in supporting recovery? 10

0   1   2   3   4   5   6   7   8   9   10   11   12   13   14   15

Sources: 2022 Member States Questionnaires.

* The MSQs were submitted by 14 of the 15 leading countries; the United States is not included in this analysis.

The MSQ responses reveal considerable variation between regions in the enactment of legislation on open government data, with European countries reporting the highest rate of adoption of such legislation, followed by Asian countries.

The 2022 Survey data indicate that all 15 countries in the VH rating class have a national development strategy that incorporates SDG objectives. These countries have a national policy or strategy to ensure digital inclusion and leaving no one behind. Governments are publishing information about people's voices being included in policymaking, with specific e-participation measures implemented for vulnerable groups.

The countries in the top rating class either empower their citizens through investment in strengthening digital literacy and competency or stimulate the activation of inclusive practices by setting out standards on how the Government and partners from the public, private and voluntary sectors should maximize accessibility to digital services.

1.5   OSI, TII and HCI performance for each EGDI group

As indicated in table 1.1 and figures 1.3 and 1.7, OSI, TII and HCI subindex values for countries in the very high EGDI group are significantly higher than the corresponding world averages, especially for those in the top two rating classes (VH and V3). For countries in the top (HV) rating class of the high EGDI group, OSI, TII and HCI values are still above, albeit closer to, the world averages. For countries in the H3 and H2 rating classes of the high EGDI group, the subindex values start to decline, and values drop below the world averages for countries in the H1 rating class. For countries in the middle and low EGDI groups, all three subindices have values below the respective world averages, with rare exceptions; those with HCI values that are well above the world average of 0.700 include Cuba (0.8384), Turkmenistan (0.7892), Libya (0.7534) and Samoa (0.7470), and the TII value for Myanmar (0.6082) is higher than the global average of 0.5750.

Figure 1.7   OSI, TII and HCI subindex values for each EGDI group, 2022
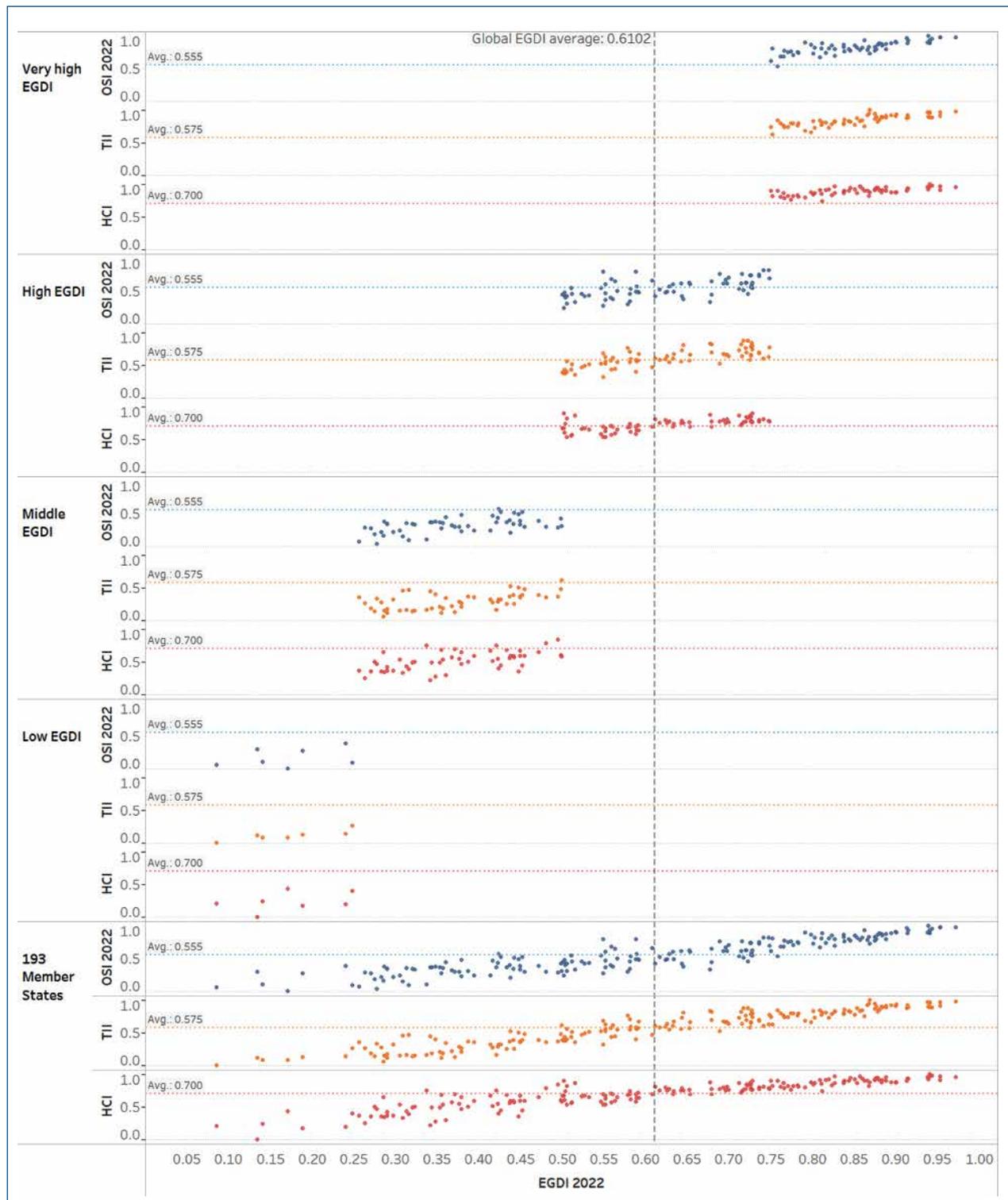
Understanding the contribution of each of the three subindices to the overall EGDI value helps countries formulate targeted policies and ensure the optimal allocation of resources for e-government development. Figure 1.8 highlights countries that have achieved high or very high levels of e-government development by improving online services provision (expressed as an OSI value) despite limited resources. Twelve upper-middle-income countries (Albania, Argentina, Brazil, China, Ecuador, Kazakhstan, Malaysia, Mexico, Peru, Serbia, Thailand and Turkey) have achieved very high OSI levels by capitalizing on very high levels of human capital development and moderate to very high levels of infrastructure development (see top horizontal green box and arrows pointing at respective OSI, TII and HCI values for this group of countries). India, Indonesia, Rwanda and Ukraine have very high OSI values even though they are low-income or lower-middle-income countries (see vertical green boxes and arrows on Figure 1.8). India and Rwanda have achieved very high OSI levels (0.7934 and 0.7935, respectively) despite having a poorly developed telecommunications infrastructure (the respective TII values for India and Rwanda are 0.3954 and 0.3209).

Figure 1.8   OSI, TII and HCI subindex values for each EGDI level, by income group, 2022
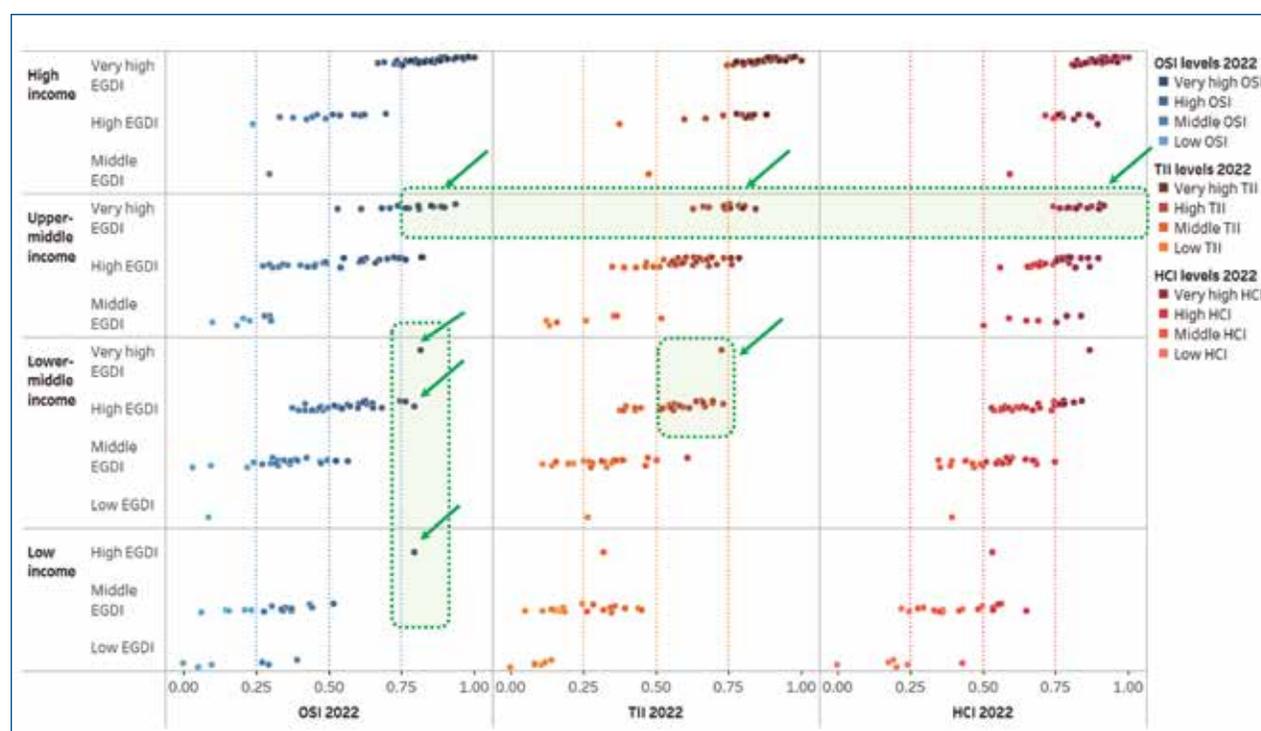
Sources: 2020 and 2022 United Nations E-Government Surveys.

1.6   National income and e-government development

The 2022 e-government assessment shows a generally positive relationship between income levels (as measured by gross domestic product per capita) and EGDI values (see figure 1.8 and table 1.2). 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. As shown in figure 1.9, the most dramatic changes in EGDI and subcomponent values have occurred in the upper-middle-income group. TII values have risen for all income groups, with the greatest increase registered by the upper-middle-income group (12.3 per cent), followed by the lower-middle-income group (7.3 per cent), the low-income group (6.4 per cent), and the high-income group (1 per cent). For all but the upper-middle-income group, average OSI values

have declined, in part due to changes in the Survey methodology (see annex A for details). The sharp increase in the average OSI value for the upper-middle-income group suggests that the countries in this group have prioritized the allocation of resources towards improving online services provision. High-income countries have already reached a rather high level of services provision, whereas low-income and lower-middle-income countries lack sufficient resources for investment in the development of online services. Low-income countries struggle with investing in human capital development and are the only group to have registered a decline in the average HCI index value between 2020 and 2022.

With the higher OSI, TII and HCI values, the upper-middle-income group will likely make rapid progress in e-government ecosystem development in the coming years, while the decline in OSI or HCI values for low-income and lower-middle-income countries may signify deepening digital divides.

While all low-income countries have EGDI values below the global average of 0.6102, some have done exceedingly well in online services provision. Rwanda, for example, has a very high OSI value (0.7935)—well above the OSI average of 0.5554 for 2022.

Table 1.2   Average EGDI and subindex values, by income group, 2022

Country grouping by income	EGDI average	OSI average	TII average	HCI average
Low income	0.2963	0.3024	0.2139	0.3726
Lower-middle income	0.5032	0.4562	0.4441	0.6092
Upper-middle income*	0.6470	0.5725	0.6040	0.7645
High income	0.8241	0.7542	0.8420	0.8762
Average for all income groups	0.6102	0.5554	0.5751	0.7001

Source: 2022 United Nations E-Government Survey.

Note: The Bolivarian Republic of Venezuela is no longer classified as an upper-middle-income country and at the time of publication had not yet been reclassified.

Figure 1.9   Percentage change in average EGDI and subindex values between 2020 and 2022, by income group
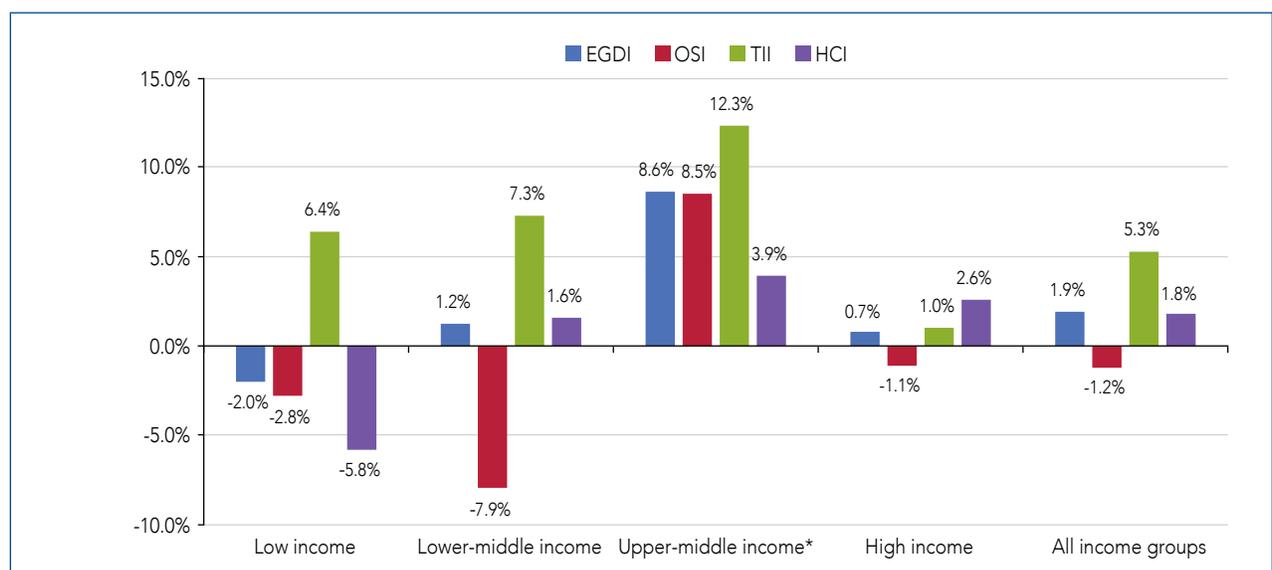
Source: 2022 United Nations E-Government Survey.

Note: The Bolivarian Republic of Venezuela is no longer classified as an upper-middle-income country and at the time of publication had not yet been reclassified.

Figure 1.10   Average EGDI values for 2020 and 2022, by income group
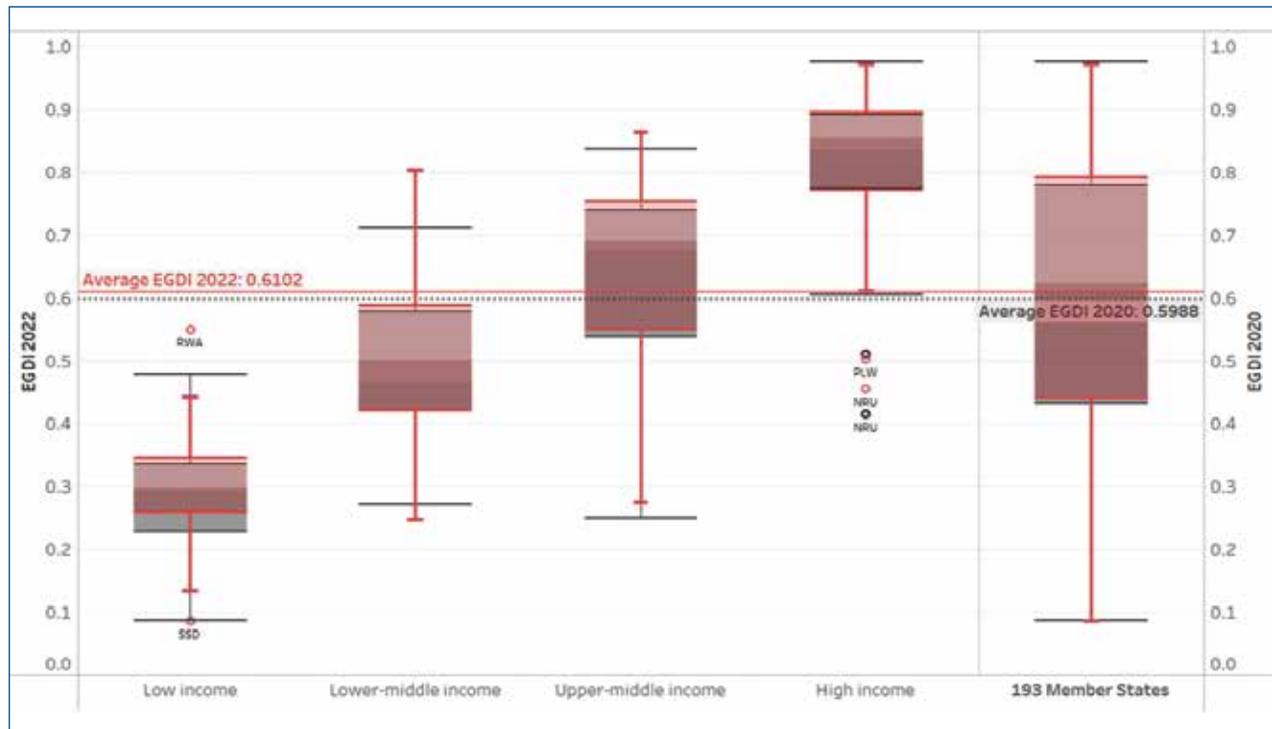
Sources: 2020 and 2022 United Nations E-Government Surveys.

Note: The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

Close to 90 per cent of the 99 Member States that have above-average EGDI values are in the high-income or upper-middle-income group, but the remaining 10 per cent are lower-middle-income countries (Plurinational State of Bolivia, Indonesia, Islamic Republic of Iran, Kyrgyzstan, Mongolia, Philippines, Sri Lanka, Tunisia, Ukraine, Uzbekistan and Viet Nam); 10 of these countries (all but the Plurinational State of Bolivia) also have above-average OSI values. Five other countries in the lower-middle-income group have below-average EGDI values but above-average OSI values: Bangladesh (0.6521), Egypt (0.5730), India (0.7934), Kenya (0.6821) and Pakistan (0.5658). These examples suggest that while the income level of a country matters, it is not the only factor determining EGDI or OSI values. As figure 1.10 illustrates, there are also high-income countries that have below-average EGDI values, such as Palau (0.5018) and Nauru (0.4548), whose underdeveloped infrastructure (typical for SIDS) is reflected in low TII values of 0.3735 and 0.4768, respectively.

Almost all high-income countries (97 per cent) have EGDI values above the global average; the same is true for 62 per cent of upper-middle-income countries but only 20 per cent of lower-middle-income countries.

1.7 Complex network analysis: a different perspective on e-government development

In 2022, UN DESA conducted a pilot study using the science of complex systems to expand the analysis of factors affecting countries' e-government development beyond income level and test a complex network analysis model to address possible inequalities and biases adherent to rankings and find as yet unidentified similarities and differences between the Member States.

Identifying external biases that affect assessment of the digital development performance of countries is a complicated task, since classifications based on proxy parameters are subject to discretionality and are not always able to capture the interrelationships between different countries. With due consideration given to the complexity of these connections, a model of a digital government ecosystem was created as a network in which countries represent nodes, with similarities in their development indicators determining the strength of the links between the nodes.

The data set used for the analysis, intended to help identify hidden similarities and differences between the countries, consisted of 305 World Development Indicators (WDIs) relating to health, economy, society and environment and 214 SDG indicators characterizing the general development level of each Member State.

The analysis resulted in the classification of countries in four clusters. The details of the pilot study and its key findings are presented in annex B. This section highlights some important findings relevant to interpreting the achievements of Member States in e-government development (as reflected in EGDI values) based on the assessment of development data covering an extended period and targeted similarities and differences between countries.

This advanced approach has a dual advantage over traditional statistical methods: first, the similarities between countries are determined by more than 500 indicators, providing a multifaceted representation of development in the clusters to which these countries are referred; second, the tool of network cluster detection offers a data-driven way to categorize different development ecosystems in which e-government development (expressed in EGDI values) can be interpreted and assessed.

Based on comparisons of EGDI values within and between clusters, the pilot study identifies "top-of-the-class" countries, whose performance surpasses expectations based on their development status, and "room-for-improvement" countries, which have the potential to reach the EGDI levels of their cluster peers by intensifying their development efforts. The study classifies as top-of-the-class countries those whose EGDI values fall above the 75th percentile for their own cluster and above the 25th percentile for at least one more developed cluster. Using similar criteria, the study classifies as room-for-improvement countries those whose index values are below the 25th percentile of their own cluster and below the 75th percentile of at least one less developed cluster.

As reflected in figure 1.11, all but one of the leading countries in the VH rating class in the very high EGDI group belong to cluster I. The United Arab Emirates, also from the VH rating class, is among the top-of-the-class countries in cluster II, reflecting a level of performance that surpasses the expectations associated with the country's cluster; Argentina, Chile, Kazakhstan, Saudi Arabia and Uruguay also perform exceptionally well in terms of e-government development in comparison with other countries in cluster II. This experimental analysis also highlights a certain level of overperformance that is partially obscured in the EGDI groupings of countries such as Uzbekistan, Indonesia, Kyrgyzstan, Philippines, Paraguay, Fiji and the Plurinational State of Bolivia (from cluster III) and Ghana and Kenya (from cluster IV). Many countries in cluster III have achieved levels of e-government development that are similar to or higher than those of some of the countries in clusters I and II.

Figure 1.11 Distribution of countries by cluster based on complex network analysis pilot study findings and EGDI values, 2022
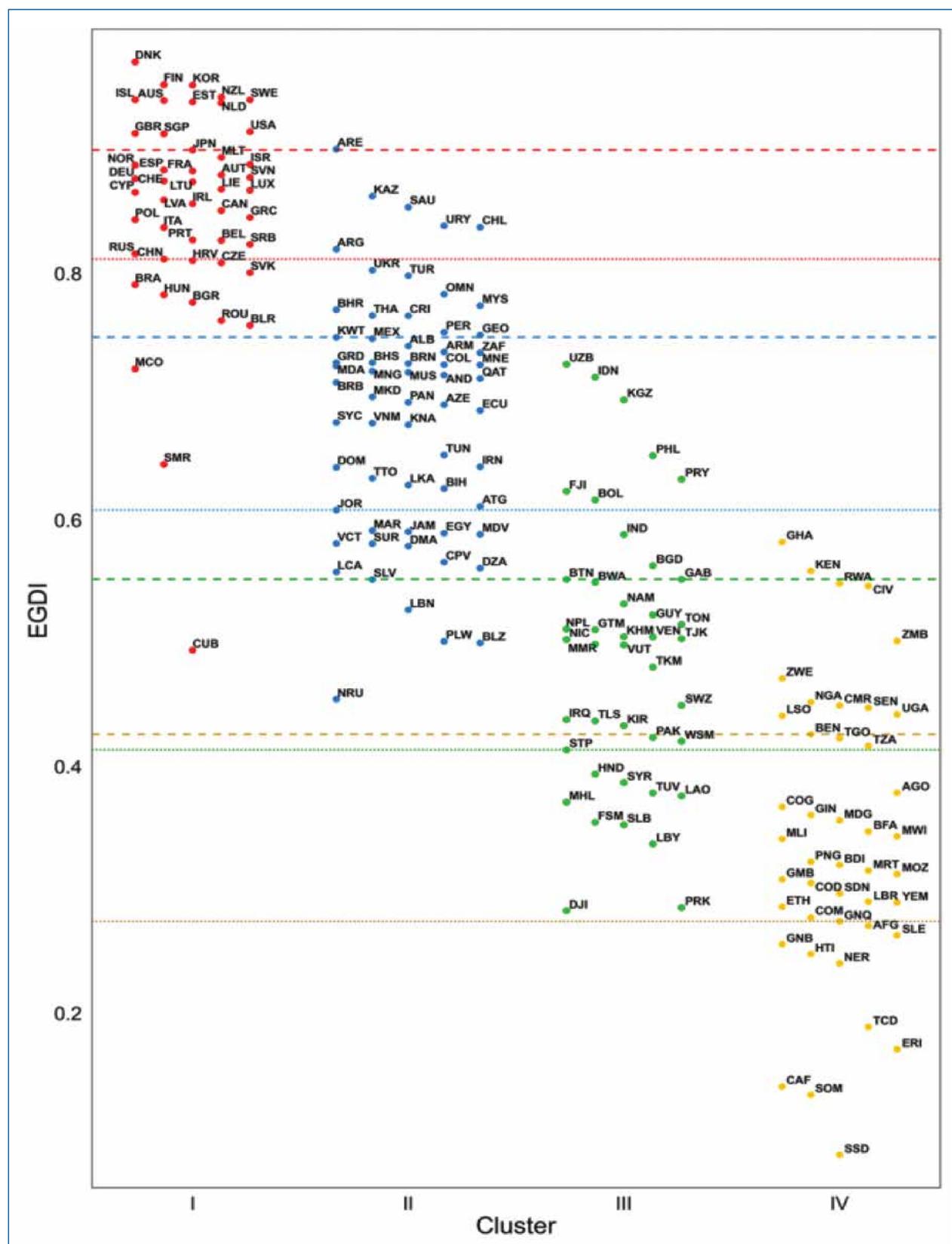
Source: Complex Network Analysis Pilot Study for the 2022 United Nations E-Government Survey (see annex B for details).

Note: The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

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The cluster groupings are as follows:

- **Cluster I**
  - o *Benchmark*: Australia, Denmark, Estonia, Finland, Iceland, Netherlands, New Zealand, Republic of Korea, Singapore, Sweden, United Kingdom, United States
  - o *Room for improvement*: Cuba, Monaco, San Marino
- **Cluster II**
  - o *Top of the class*: Argentina, Chile, Kazakhstan, Saudi Arabia, United Arab Emirates, Uruguay
  - o *Room for improvement*: Belize, El Salvador, Lebanon, Nauru, Palau
- **Cluster III**
  - o *Top of the class*: Fiji, Indonesia, Kyrgyzstan, Paraguay, Philippines, Plurinational State of Bolivia, Uzbekistan
  - o *Room for improvement*: Democratic People's Republic of Korea, Djibouti, Federated States of Micronesia, Honduras, Lao People's Democratic Republic, Libya, Marshall Islands, Solomon Islands, Syrian Arab Republic, Tuvalu
- **Cluster IV**
  - o *Top of the class*: Cameroon, Cote d'Ivoire, Ghana, Kenya, Lesotho, Nigeria, Rwanda, Senegal, Uganda, Zambia, Zimbabwe
  - o *Trailing*: Afghanistan, Central African Republic, Chad, Eritrea, Guinea-Bissau, Haiti, Niger, Sierra Leone, Somalia, South Sudan

These findings indicate that individual countries are capable of advancing their e-government development beyond the constraints imposed by their cluster characteristics and that top-of-the-class countries in e-government development are found in each EGDI group. Considering these results, it will be interesting to engage in further exploration and investigation of new indicators that may contribute to providing an even more accurate assessment of e-government development.

1.8 Online Services Index

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.

In the 2022 edition, for the first time, the OSI is calculated based on five weighted subindices. Specifically, Member States are assessed for services provision (45 per cent), technology (5 per cent), the institutional framework supporting e-government development (10 per cent), content provision (5 per cent), and e-participation (35 per cent). The overall composite OSI (hereinafter referred to as the OSI to ensure consistency with previous surveys) is calculated based on the normalized values for each OSI subindex (see annex A for details on the methodology used).

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 value is an indication of current best practices rather than perfection. Similarly, a lower value, or a value that has not changed since the Survey's last edition, does not mean there has been no progress in e-government development.

Survey results relating to the OSI and its five subindices are presented below.

1.8.1 Country groupings by OSI and EGDI levels

A country's level of online services development does not always coincide with its overall EGDI level because the latter also comprises the TII and HCI subcomponents. It is important to identify cases in which the OSI level is higher or lower than the overall EGDI level so that targeted policies can be adopted and sufficient resources allocated for the improvement of online services provision. Table 6 in annex A groups the 193 United Nations Member States according to OSI level and also provides a corresponding EGDI level for each country. Figure 1.12 represents a snapshot distribution of OSI and EGDI levels, highlighting the positive correlation between progress in online services provision and overall improvement in e-government development (as reflected in OSI and EGDI values).

As indicated in table 1.3, OSI and EGDI levels coincide for 121 of the 193 Member States (63 per cent). However, 72 countries have OSI levels that are higher or lower than their respective EGDI levels, suggesting that their online services provision is at a more or less advanced stage than the development of their telecommunications infrastructure and/or human capital (as reflected in TII and HCI values and levels). Annex A provides a snapshot of divergences in OSI levels from respective HCI and TII levels for all of the Member States.

Figure 1.12 Snapshot distribution of OSI and EGDI levels for United Nations Member States, 2022
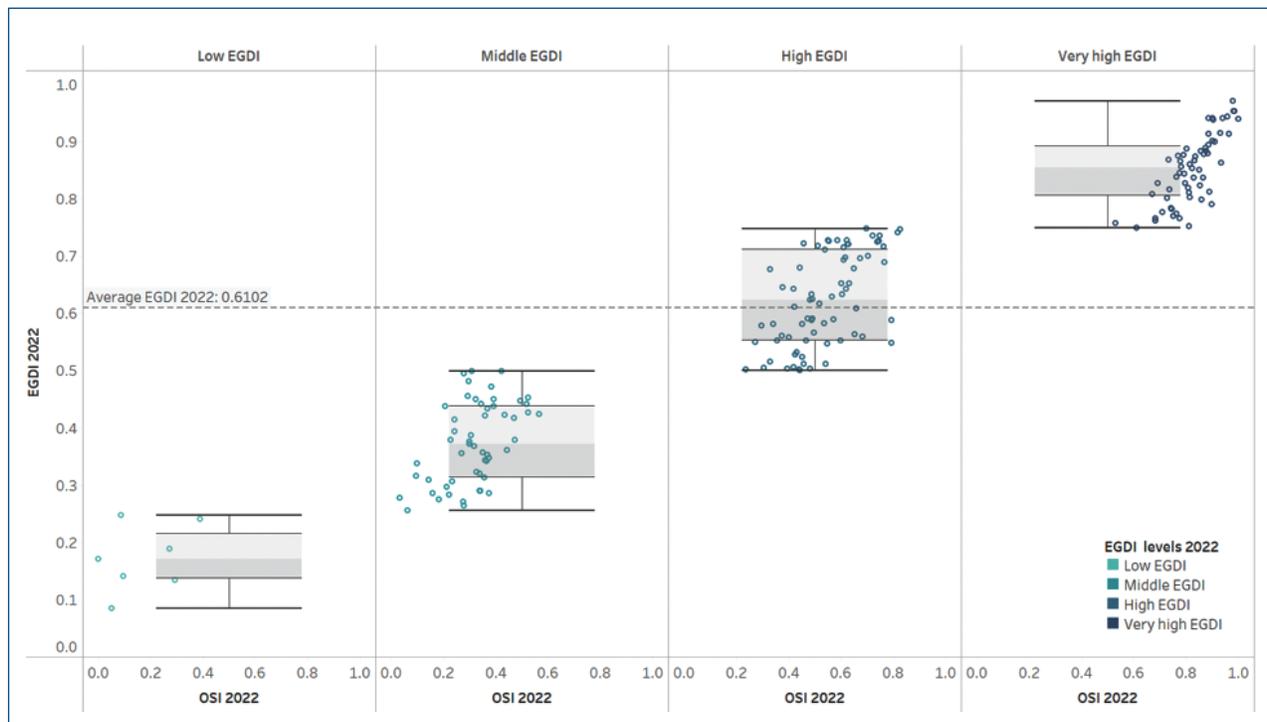
Source: 2022 United Nations E-Government Survey.

Table 1.3   Convergence and divergence of OSI levels relative to EGDI levels, 2022

Member States		Very high EGDI		High EGDI		Middle EGDI		Low EGDI	
Total	193	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Very high OSI	54	48	88.9	6	11.1	-	-	-	-
High OSI	50	12	24.0	34	68.0	4	8.0	-	-
Middle OSI	70	-	-	32	45.7	35	50.0	3	4.0
Low OSI	19	-	-	1	5.3	14	73.7	4	21.1

Source: 2022 United Nations E-Government Survey.

Note: The cells shaded in blue indicate convergence between OSI and EGDI levels. The cells shaded in green and red represent divergence (green = EGDI level > OSI level; red = OSI level > EGDI level).

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), 48 have similarly high TII and HCI values. The remaining six countries have combinations of TII and HCI levels that diverge in some way from their respective OSI levels (see table 1.4).

Table 1.4   TII and HCI subcomponent convergence and divergence for the very high OSI group, 2022

Very high OSI			
High TII + Very high HCI	High TII + High HCI	Middle TII + Very high HCI	Middle TII + High HCI
Mexico Albania	Indonesia	Ecuador	India Rwanda

Source: 2022 United Nations E-Government Survey.

Albania, Mexico and Indonesia have highly developed infrastructure and human capital and are well on track to move up to the very high EGDI level. Rwanda, India and Ecuador are at a fairly high level in terms of human capital development and online services provision, but these countries are held back by relatively lower levels of infrastructure development (TII values are 0.3209, 0.3954 and 0.5269, respectively).

Box 1.1   Rwanda, India and Ecuador

Three countries with poorly developed telecommunications infrastructure—Rwanda, India and Ecuador—have stood out for their efficacy in strengthening the provision of inclusive, user-centric online services.

In **Rwanda**, public institutions offer 98 online services. The significant increase in national investment in online services provision has allowed the country to become a leader among the LDCs and to compete with the world's leading countries in e-government development. Aiming to address challenges and improve user-centricity in services provision, Rwanda is focusing on collecting real-time information for internal and strategic public planning, to guide decision-making processes, and to inform the development of targeted solutions. The country uses real-time specific, measurable, attainable, relevant and time-bound (SMART) analytics to track services delivery performance, including through heat maps and location-referenced quick performance reviews of public entities such as schools, hospitals and farming areas. The Government is strengthening inter-agency data sharing to facilitate problem solving and policy alignment and is taking steps to reduce costs, to improve the quality of existing services or develop new ones, to prevent, detect and mitigate errors, to decrease corruption, and to foster innovation with an eye to anticipating future trends. With financing from the World Bank Group and through collaboration with the private sector, Rwanda has launched several digital inclusion initiatives to help 250,000 households acquire digital devices and to provide 3 million people with the opportunity to improve their digital literacy. As part of its ICT for Governance Cluster Strategy 2020-2024, Rwanda is planning to further expand inclusive digital services and ICT-enabled empowerment.

The Government of **India** is implementing the Digital India initiative to build people-centric services for marginalized groups. The following are among the most recent initiatives:

- The Accessible India Campaign and mobile application has become a nationwide flagship initiative for achieving universal accessibility—one that enables people with disabilities to have access to equal opportunities, live independently, and participate fully in all aspects of life in an inclusive society. The campaign focuses specifically on enhancing the accessibility of the built environment, transport system and information and communication ecosystem. The mobile app is a crowdsourcing platform that allows administrators to obtain comprehensive information on inaccessible places across the country and to respond to relevant needs. Through this programme, 1,250 sign language interpreters have been trained, and 588 State government and 95 central government websites have become accessible for persons with disabilities.

- The AgriMarket app keeps farmers abreast of crop prices and discourages them from carrying out distress sales. Farmers can obtain crop price information for markets within a 50-kilometre radius using mobile GPS. To date, more than 80 million farm families have been reached through this app.

- MyGov is a platform created to promote and support public engagement in decision-making processes. The platform has 24.5 million registered users and offers many e-participation tools to facilitate the formation of online groups and thematic discussions, polls, surveys, blogs and talks. During 2021 and 2022, the Government has shared its plan for digital transformation with 9.5 million participants.

Box 1.1 *(continued)*

In **Ecuador**, the political commitment to reducing inequalities through investment in digital transformation is articulated in the 2021-2025 Opportunity Plan. Particular attention is given to bridging existing gaps in Internet access. The country has signed an agreement with the International Telecommunication Union (ITU) to move forward with plans to expand the 4G network and guarantee the connectivity of schools and health-care facilities that have been excluded until now, including in rural areas.

Sources: Member States Questionnaires; World Bank, "World Bank provides $100 million to accelerate Rwanda's digital transformation", press release, 30 November 2021 (Washington, D.C.), available at https://www.worldbank.org/en/news/press-release/2021/12/01/world-bank-provides-100-million-to-accelerate-rwanda-s-digital-transformation; Digital India website, available at https://www.digitalindia.gov.in/; BNamericas, "Ecuador's plans to promote digital transformation and industry 4.0", 21 October 2021, available at https://www.bnamericas.com/en/interviews/ecuadors-plans-to-promote-digital-transformation-and-industry-40.

High OSI group

Among the 50 countries with high OSI values (0.50 to 0.75), 16 have divergent HCI and/or TII levels (see table 1.5).

Table 1.5   TII and HCI subcomponent convergence and divergence for the high OSI group, 2022

High OSI			
Very high TII + Very high HCI	**High TII + Very high HCI**	**Middle TII + Middle HCI**	**Low TII + High HCI**
Belarus, Belgium, Bulgaria, Costa Rica, Czech Republic, Hungary, Liechtenstein, Oman, Romania, Russian Federation, Slovakia	Georgia	Pakistan, Nigeria, Benin	Uganda

Source: 2022 United Nations E-Government Survey.

Twelve of the sixteen countries listed in the table—Belarus, Belgium, Bulgaria, Costa Rica, Czech Republic, Georgia, Hungary, Liechtenstein, Oman, Romania, the Russian Federation and Slovakia—have a very high EGDI level that largely derives from high or very high HCI and TII levels, but more attention needs to be directed towards improving online services provision. The remaining four countries (Uganda, Pakistan, Nigeria and Benin) would benefit from investment in both TII and HCI development.

Middle OSI group

Divergences in EGDI and OSI levels are most pronounced for the group of countries with middle OSI values (0.25 to 0.50); among these 70 countries, 32 have high EDGI levels, and 3 have low EGDI levels. Table 1.6 identifies the variations in TII and/or HCI levels that are responsible for this divergence.

Well over half of the countries in the middle OSI group have high or very high TII values and high or very high HCI values; relatively advanced human capital and infrastructure development may constitute a solid foundation for efforts to improve online services provision in these countries. Underdeveloped or unevenly developed infrastructure constrains e-government development in Belize, Guyana, Lebanon, Namibia, Nepal, Nicaragua, Tajikistan and Zambia. Middle OSI levels have been achieved by Niger (0.3904), Somalia (0.2944) and Chad (0.2726), signifying that low levels of infrastructure and human capital development have not been an impediment to investment in online services delivery.

Table 1.6   TII and HCI subcomponent convergence and divergence for the middle OSI group, 2022

Middle OSI						
Very high TII + Very high HCI	Very high TII + High HCI	High TII + Very high HCI	High TII + High HCI	Middle TII + Very high HCI	Middle TII + High HCI	Low HCI + Low TII
Monaco, Seychelles, Saint Kitts and Nevis	San Marino	Fiji, Antigua and Barbuda, Iran (Islamic Republic of)	Algeria, Bosnia and Herzegovina, Botswana, Cabo Verde, Cambodia, Dominica, El Salvador, Gabon, Jamaica, Maldives, Morocco, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago	Tonga, Venezuela (Bolivarian Republic of)	Belize, Guyana, Lebanon, Namibia, Nepal, Nicaragua, Tajikistan, Zambia	Niger, Somalia, Chad

Source: 2022 United Nations E-Government Survey.

Low OSI group

Of the 19 countries with low OSI values (0.00 to 0.25), 14 are in the middle EDGI group and one is in the high EGDI group. Divergences resulting from TII and/or HCI levels for these countries are presented in table 1.7.

Table 1.7   TII and HCI subcomponent convergence and divergence for the low OSI group, 2022

Low OSI				
Middle TII + Very high HCI	Middle TII + High HCI	Middle TII + Middle HCI	Low TII + High HCI	Low TII + Middle HCI
Libya, Palau	Honduras, Iraq, Sao Tome and Principe	Djibouti, Gambia, Guinea-Bissau, Mauritania, Sudan	Democratic People's Republic of Korea, Democratic Republic of Congo, Equatorial Guinea, Tuvalu	Comoros

Source: 2022 United Nations E-Government Survey.

Online services provision lags behind infrastructure and human capital development in Libya, Palau, Honduras, Iraq, Sao Tome and Principe, Djibouti, Gambia, Guinea-Bissau, Mauritania and Sudan. At the same time, due to poor telecommunications infrastructure, the Democratic People's Republic of Korea, Democratic Republic of the Congo, Equatorial Guinea, Tuvalu and Comoros are falling behind, despite having high or middle levels of human capital development.

Movement between OSI groups

A total of 24 countries have moved from a lower to a higher OSI level since 2020; 7 moved from the low to the middle OSI group, 9 moved from the middle to the high OSI group, and 8 moved from the high to the very high OSI group. For 18 countries, however, the OSI level has declined; 8 moved from the very high to the high OSI group, 5 moved from the high to the middle OSI group, and 5 moved from the middle to the low OSI group. Although more countries have moved upward than downward, the volatility surrounding this EGDI subindex is concerning.

1.8.2   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 1.13). Most countries in the high-income bracket (64 per cent) have OSI values higher than the group average of 0.7542 and well above the global OSI average of 0.5554.

Figure 1.13   OSI averages by income group, 2022
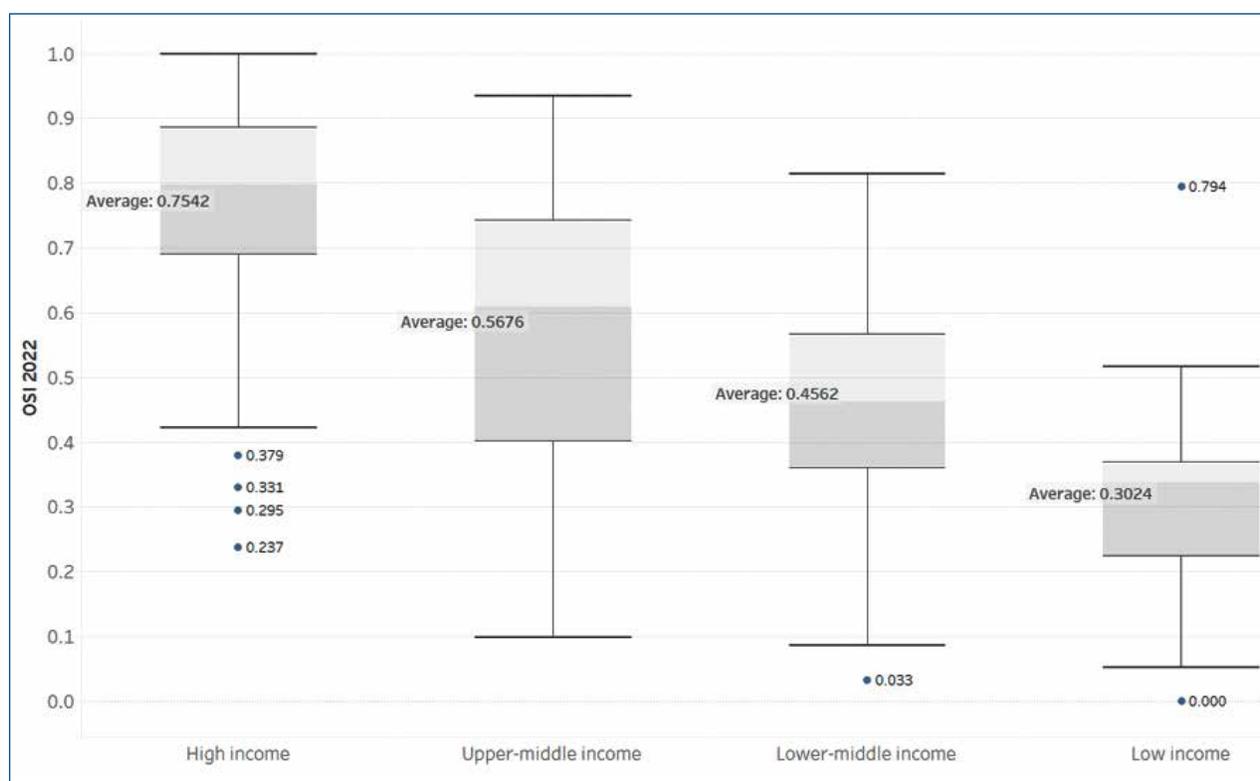
Source: 2022 United Nations E-Government Survey.

High-income countries also have a denser distribution of OSI values around the median value, suggesting a more even provision of online services. Upper-middle-income countries have greater variance in their OSI values; slightly over 51 per cent have average OSI values that are higher than the global average. The OSI averages for the low-income group (0.3024) and the lower-middle-income group (0.4562) are below the global OSI average of 0.5554.

1.8.3   Services provision subindex: progress in online services delivery

The services provision subindex of the OSI assesses a wide range of features, including the availability of various online transactional services, how government services are accessed (through one main portal or multiple dedicated portals), the existence and functionality of e-procurement platforms, the integration of GIS or geospatial data and technologies in online services provision, and the availability of sector-specific services and services for people in vulnerable situations. The data analysis and key findings are presented below.

Almost three quarters of the Member States (138 countries) use "one-stop-shop" portals for the online provision of different government services. The number of countries offering at least 1 of the 22 online transactional services assessed increased from 162 in 2020 to 189 in 2022, or by 16.7 per cent. The provision of 16 types of services is the global average, but 115 of the Member States (61 per cent) offer more (see figure 1.14).

Figure 1.14   Numbers of Member States offering specified numbers of online transactional services, 2022
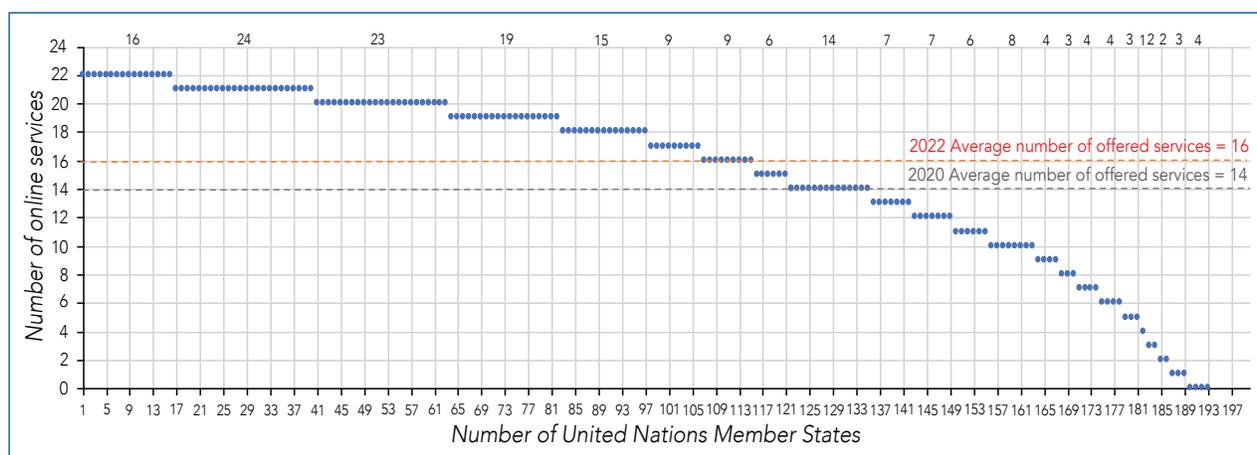
Source: 2022 United Nations E-Government Survey.

The number of countries providing the online services assessed has risen by an average of 5 per cent since 2020, with increases registered for all but one type of service. The number of countries offering services that allow users to apply for social protection programmes (such as maternity care, child subsidies, pensions, housing and food allowances) has seen the most significant increase (17 per cent), which may have occurred in response to the COVID-19 pandemic (see figure 1.15 and table 1.8). The only service being offered by fewer countries this year is the registration of motor vehicles, though there has been only a slight decline (6.1 per cent).

Globally, the most prevalent online transactional service is the registration of a new business; the number of countries providing this service has risen from 162 to 177 (or by 9.2 per cent) since 2020. Overall, business-related services such as registration, licensing and filing company taxes are among the five most frequently offered government services. The submission of business tax forms and payments online, similar to the services offered for income tax and Value Added Tax (VAT) submissions, is a new indicator added in 2022. The data suggest that tax filing services are offered more frequently to businesses (153 countries) than to individuals (151 countries for income tax and 142 countries for VAT).

Figure 1.15 Trends in the provision of online transactional services, 2020-2022 (Number of countries and percentage change)
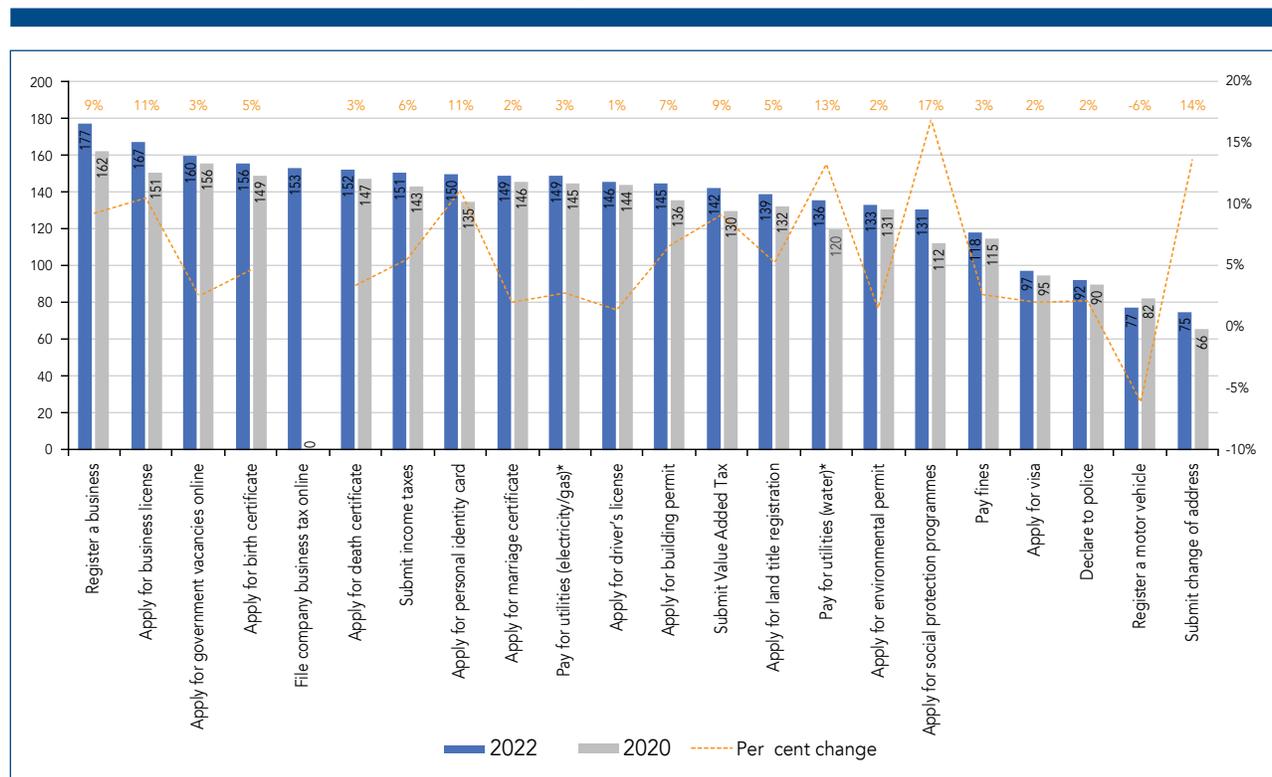
Source: 2022 United Nations E-Government Survey.

The next most commonly offered online services include applying for government vacancies and business licences, requesting birth, death, and marriage certificates, and paying utility bills. Among the least offered online services are paying fines (118 countries), applying for a visa (97 countries), making declarations to the police (92 countries), registering motor vehicles (77 countries) and submitting a change of address (75 countries).

The global coverage rate—the combined average of the proportion of Member States providing each type of online transactional service—rose from 66 per cent in 2020 to 71 per cent in 2022. The corresponding percentages for the different OSI groups vary widely. As shown in table 1.8 and figure 1.16, among countries with very high OSI values, coverage of the 22 services assessed is nearly universal (averaging 93 per cent for the 54 countries in this group). Countries with high OSI values also have strong online services coverage (averaging 83 per cent for the 50 countries in this group). The proportions are significantly lower for the remaining OSI groups, with coverage averaging 58 per cent for the 70 countries in the middle OSI group and 20 per cent for the 19 countries in the low OSI group. Around three quarters of the countries in the low OSI group (14 of the 19) are LDCs, LLDCs and/or SIDS.

It is important to note that progress is being made in online services delivery even in countries with low OSI levels, where the average number of online services offered rose from 1 in 2018 to 4.5 in 2022. Within the low OSI group, Equatorial Guinea offers the highest number of online services (14), followed by Djibouti, Honduras, Sao Tome and Principe, and Tuvalu (8-10); in 2020, the maximum number of services offered by any country in the low OSI group was nine. The five services most commonly provided by countries in this group are registering a business, applying for a building permit, and applying for a birth, death or marriage certificate.

Table 1.8   Trends in the provision of online transactional services and breakdown by OSI level, 2020-2022 (Number of countries and percentage change)

Trends in online transactional services, 2022	2022	2020	Per cent change	Very high OSI (total 54)		High OSI (total 50)		Middle OSI (total 70)		Low OSI (total 19)		UN Member States (193 countries)	
				Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Register a business	177	162	9%	54	100%	49	98%	64	91%	10	53%	177	92%
Apply for business license	167	151	11%	52	96%	47	94%	64	91%	4	21%	167	87%
Apply for government vacancies	160	156	3%	52	96%	49	98%	56	80%	3	16%	160	83%
Apply for birth certificate	156	149	5%	53	98%	45	90%	52	74%	6	32%	156	81%
File company/business taxes online	153	-		54	100%	48	96%	47	67%	4	21%	153	79%
Apply for death certificate	152	147	3%	52	96%	44	88%	50	71%	6	32%	152	79%
Submit income taxes	151	143	6%	54	100%	49	98%	45	64%	3	16%	151	78%
Apply for personal identity card	150	135	11%	52	96%	47	94%	45	64%	6	32%	150	78%
Apply for marriage certificate	149	146	2%	52	96%	42	84%	49	70%	6	32%	149	77%
Pay for utilities (electricity/gas)*	149	145	3%	51	94%	45	90%	50	71%	3	16%	149	77%
Apply for driver's license	146	144	1%	52	96%	43	86%	48	69%	3	16%	146	76%
Apply for building permit	145	136	7%	50	93%	42	84%	46	66%	7	37%	145	75%
Submit Value Added Tax	142	130	9%	53	98%	46	92%	40	57%	3	16%	142	74%
Apply for land title registration	139	132	5%	49	91%	43	86%	41	59%	6	32%	139	72%
Pay for utilities (water)*	136	120	13%	50	93%	39	78%	45	64%	2	11%	136	70%
Apply for environmental permit	133	131	2%	51	94%	47	94%	34	49%	1	5%	133	69%
Apply for social protection programmes	131	112	17%	54	100%	43	86%	33	47%	1	5%	131	68%
Pay fines	118	115	3%	51	94%	42	84%	21	30%	4	21%	118	61%
Apply for visa	97	95	2%	36	67%	32	64%	26	37%	3	16%	97	50%
Declare to police	92	90	2%	49	91%	22	44%	19	27%	2	11%	92	48%
Register motor vehicle	77	82	-6%	39	72%	26	52%	11	16%	1	5%	77	40%
Submit change of address	75	66	14%	44	81%	28	56%	3	4%	0	0%	75	39%

Sources: 2020 and 2022 United Nations E-Government Surveys.

Figure 1.16   Percentage of countries offering each type of online transactional service, by OSI level, 2022
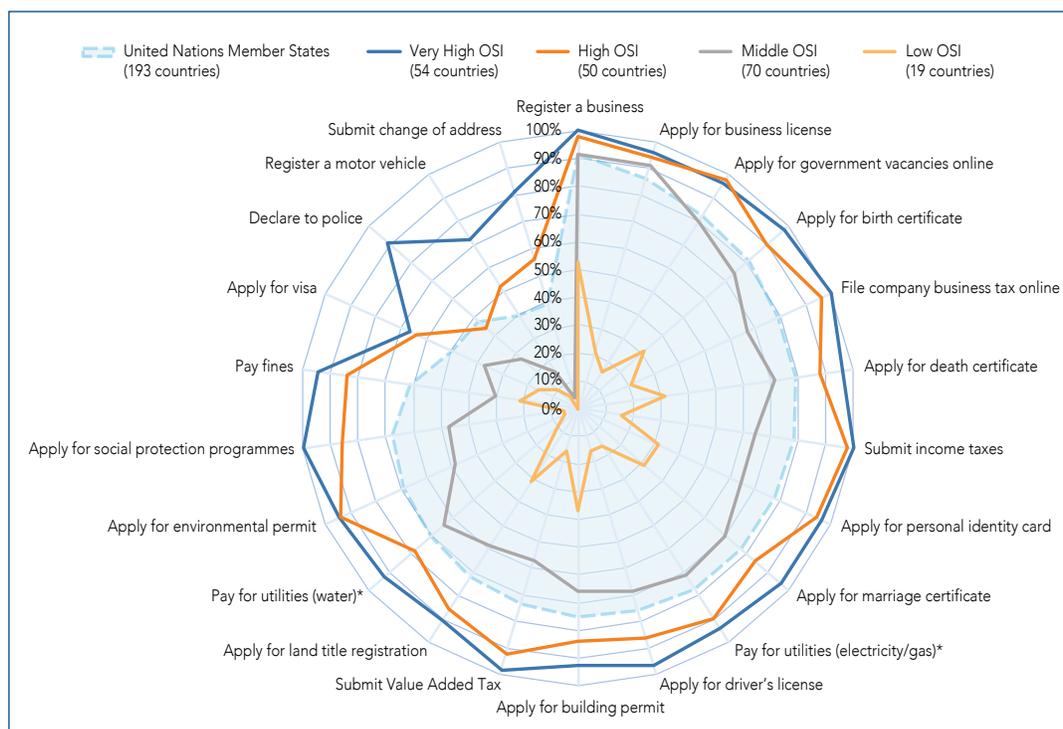
Source: 2022 United Nations E-Government Survey.

*In previous Surveys, utilities were assessed together. Since 2020, the E-Government Survey has collected disaggregated data on utility payments for (a) electricity/gas and (b) water to allow more accurate tracking of services provision in all countries.

The 2022 Survey assessed not only the availability of the listed services, but also the level of digitalization—or in other words, whether users could complete transactions digitally. The assessment focused on applying for government vacancies, business licenses and registration, social protection programmes, environmental and building permits, land title registration, personal identity cards, driver's licenses, and birth, marriage and death certificates.

The findings indicate that the majority of countries use their portals to provide information, and the process of services delivery is partially digitalized, but one still needs to appear in person to complete most transactions (see figure 1.17). There is, however, a clear push towards higher levels of digitalization whereby users will no longer have to download or print forms but can complete their transactions fully online.

The data collected suggest that countries tend to assign priority to digitalizing the registration and licensing of businesses and the process of applying for government vacancies; more than half of the countries offering such services have them fully digitalized. The number of countries publishing government vacancies online rose from 156 in 2020 to 160 in 2022, and in 85 of those countries people can apply for government positions directly online. At the regional level, Europe has the highest proportion of countries recruiting for public positions online (41 of 43 countries), while Africa has the lowest (36 of 54 countries). It is encouraging to see that of the 131 countries allowing users to apply for social protection programmes online, 74 (56 per cent) have systems in place that allow all relevant transactions to be fully completed online.

Figure 1.17   Numbers of countries offering selected services that can be completed partially or fully online, 2022
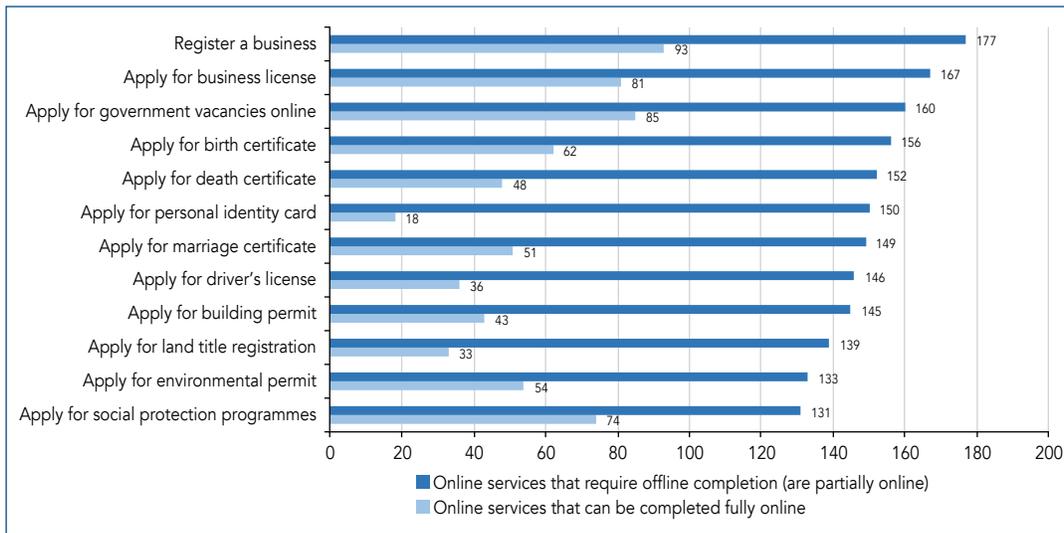
Source: 2022 United Nations E-Government Survey.

Public procurement services

As shown in figure 1.18, 127 countries have dedicated e-procurement portals, and 88 of them (69 per cent) use digital invoicing. While the number of countries with e-procurement portals has increased by only 2 since 2020, the number of countries with the ability to issue digital invoices has increased by 21 (17 per cent) over the past two years. The highest regional concentration of e-procurement portals is in Europe (39 of 43 countries, or 91 per cent), followed by Asia (36 of 47 countries, or 77 per cent), the Americas (26 of 35 countries, or 74.3 per cent), Oceania (7 of 14 countries, or 50 per cent), and Africa (19 of 54 countries, or 35.2 per cent). In Europe and Asia, most countries with e-procurement portals also use digital invoices (the respective proportions are 90 and 72 per cent). In other regions, the use of digital invoicing is less prevalent.

Figure 1.18   Number of countries with e-procurement platforms and digital invoicing capabilities, by region, 2022
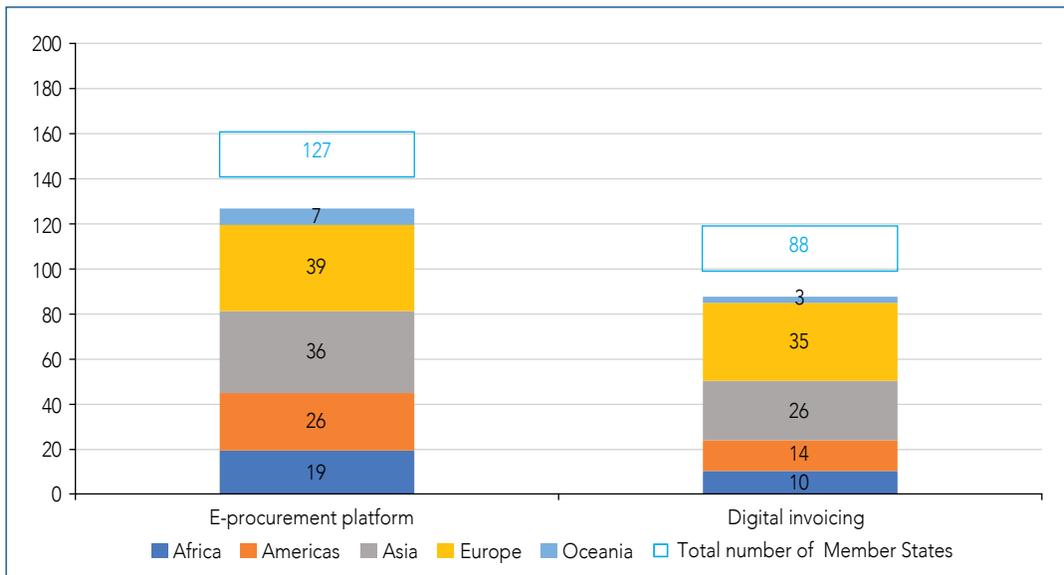
Source: 2022 United Nations E-Government Survey.

E-procurement portals and digital invoices are far more common in high-income and upper-middle-income countries than in lower-middle-income countries, and these features are much less prevalent in low-income countries (see figure 1.19). For comparison, 8 out of 10 high-income countries are likely to have both a dedicated platform and a reliable system for digital invoicing, while the same is true for only 4 out of 10 lower-middle-income countries and 1 out of 10 low-income countries.

Figure 1.19 Percentage of countries with e-procurement platforms and digital invoicing, by income level, 2022
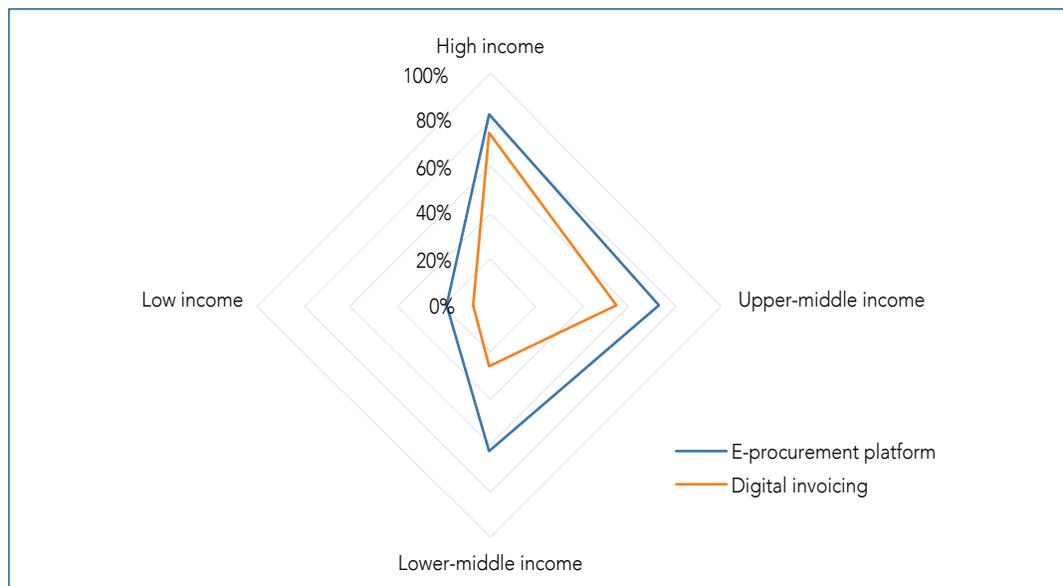
The use of geographic information systems and geospatial technologies in online services provision

The 2022 Survey assessed the availability of government services that integrate or are supported by GIS or other geospatial technologies (see figure 1.20). The results indicate that 119 of the Member States (about 62 per cent) offer such services, though the corresponding proportions vary widely among the different OSI and regional groups. All 54 of the countries in the very high OSI group offer services supported by GIS or other geospatial technologies; the same is true for 34 of the 50 countries in the high OSI group and 30 of the 70 countries in the middle OSI group. Europe is the region with the highest proportion of countries using geospatial technologies in services provision (91 per cent), followed by the Americas (69 per cent), Asia (60 per cent), Oceania (50 per cent) and Africa (39 per cent).

Figure 1.20 Number of countries that offer services integrating or supported by GIS or other geospatial technologies, by OSI level and region, 2022
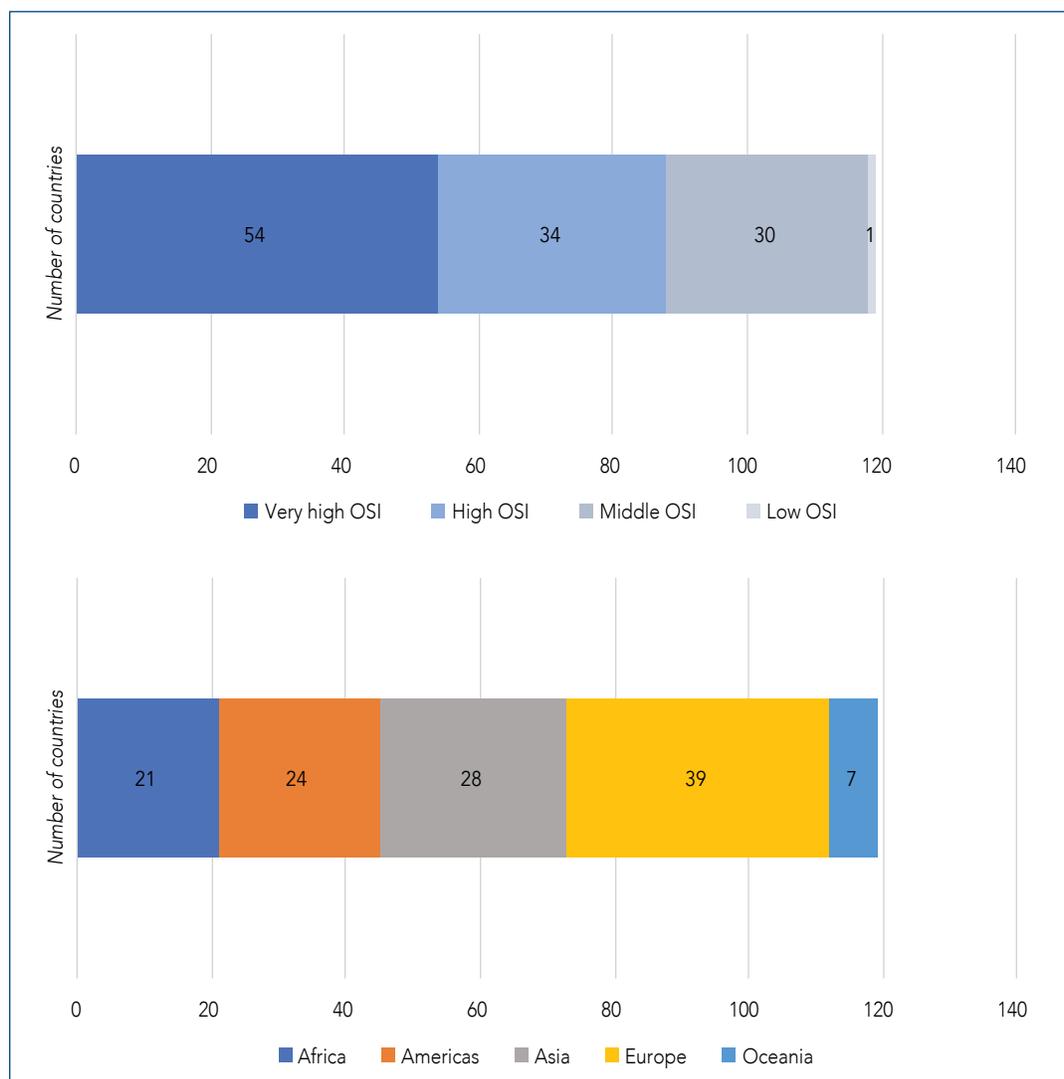
Source: 2022 United Nations E-Government Survey.

Targeted services for people in vulnerable situations

The 2022 Survey has assessed the availability of a wider range of services for vulnerable groups, covering not only services specifically targeting populations that are traditionally identified as vulnerable (including persons with disabilities, women, older persons, immigrants, youth, and people living in poverty), but also frequently offered government services that support different vulnerable groups or multiple underserved populations at the same time. This subsection shares the Survey findings and, where possible, assesses progress made since the previous Survey.

The number of countries providing information and services that target specific vulnerable populations increased by 6 per cent between 2020 and 2022, compared with 11 per cent for the previous two-year period (see figure 1.21). Services aimed at supporting immigrants are provided by the highest number of countries (163), followed by services for women (162 countries), persons with disabilities (157 countries), young people (155 countries), and people living in poverty and older

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people (144 countries each). The highest rates of growth in online services provision (as reflected in the increase in the number of countries providing the service) have been for immigrants (19 per cent) and people living in poverty (11 per cent); the number of countries providing services targeting women and persons with disabilities rose by approximately 6 per cent each, while the number of countries offering services for older persons and young people declined by 5 and 1 per cent, respectively. Between 23 and 31 per cent of those services are fully digitalized, allowing people to complete their transactions online.

Figure 1.21   Numbers of countries offering services for people in vulnerable situations that can be completed partially or fully online, 2020 and 2022 (Percentage change)
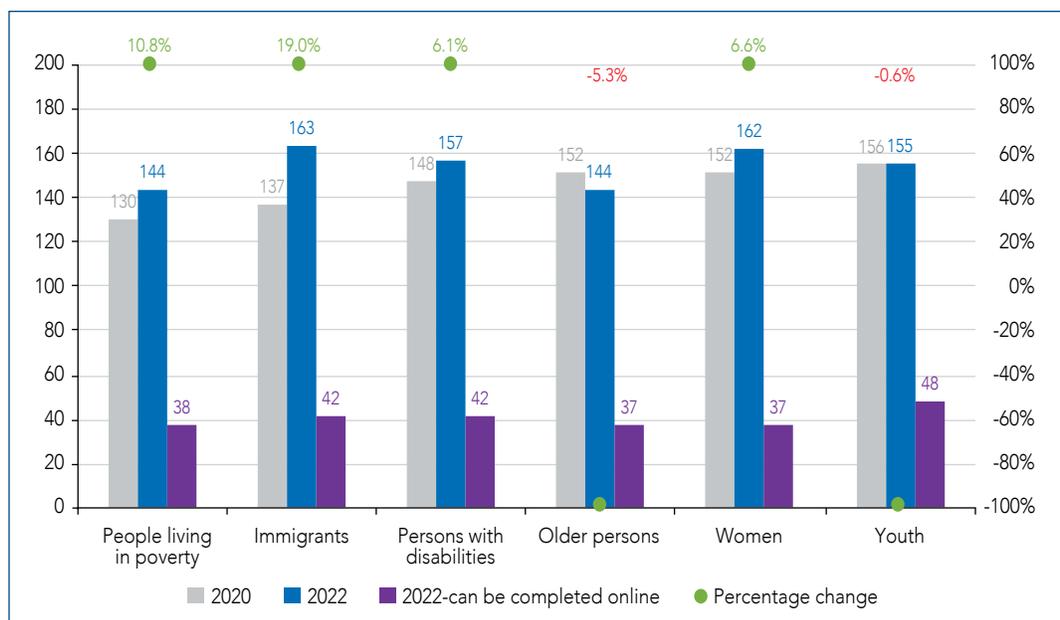
Source: 2022 United Nations E-Government Survey.

As noted above, the Survey has traditionally assessed a range of services targeting specific people in vulnerable situations. For those living in poverty, for instance, Survey indicators have focused on people's ability to apply for government support. For older persons, the Survey has explored the provision of information and services relating to retirement, housing facilities, long-term-care programmes, and options for receiving care and support at home. For young people, the availability of information and services linked to employment programmes, scholarships and government funding has been the focus. In 2022, a number of new areas are being assessed, including services for people retiring from a job and for those applying for unemployment benefits, child benefits, maternal or newborn benefits, disability compensation, or other benefits due to illness or injury. As shown in figure 1.22, services linked to job retirement are offered by the highest number of countries (152), followed by services that allow users to apply for disability compensation (134), benefits due to illness or injury (131), child benefits (126), and maternal or newborn benefits (124). In just over half of the Member States (106 countries), individuals can file for unemployment benefits online.

As illustrated in figure 1.23, Europe is the region with the highest proportion of countries providing online services for people in vulnerable situations (95 per cent), followed by the Americas (72 per cent), Asia (69 per cent), Oceania (45 per cent), and Africa (44 per cent).

Figure 1.22 Number of countries providing newly assessed online services for people living in vulnerable situations, and number and percentage of countries in which such services can be fully completed online, 2022
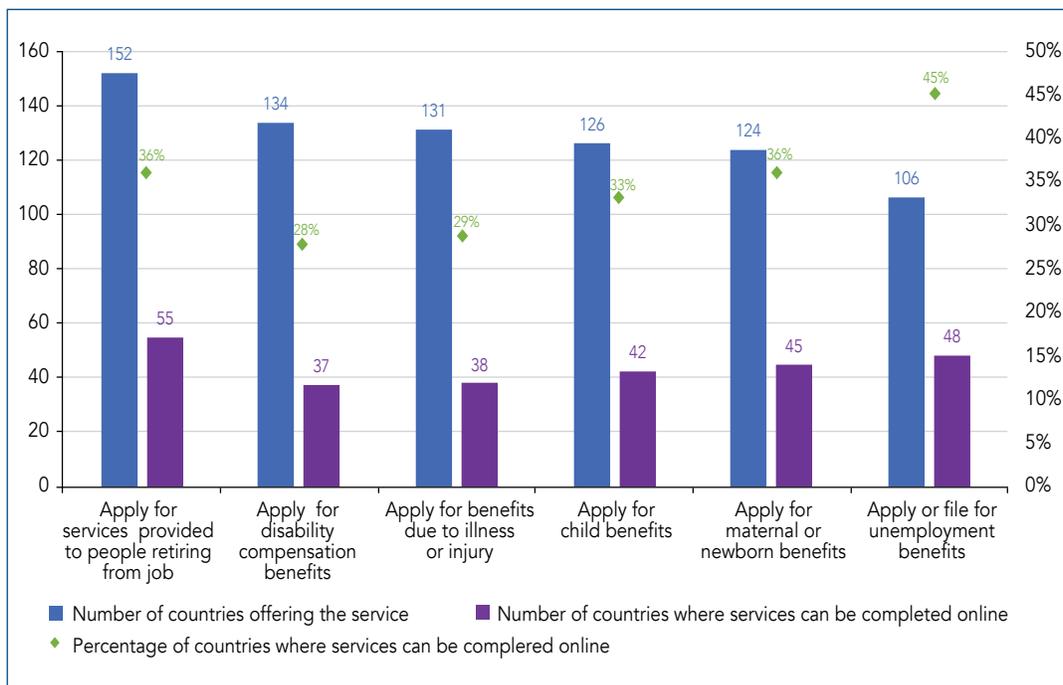
Source: 2022 United Nations E-Government Survey.

Figure 1.23 Percentage of countries providing newly assessed online services to people in vulnerable situations, by region, 2022d number and percentage of countries in which such services can be fully completed online, 2022
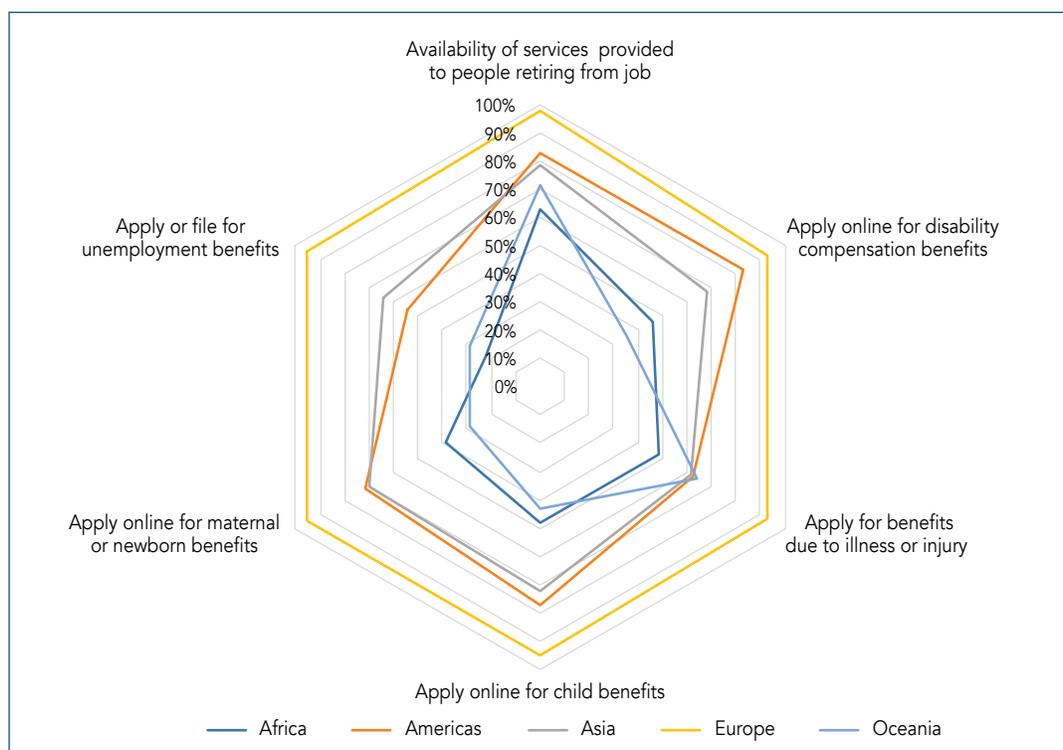
Source: 2022 United Nations E-Government Survey.

Sector-specific online information and services: sharing via mobile technologies

The Survey has been tracking the development of online services relating to health, education, employment, environment and social protection since 2016; since 2020, the Survey has also been tracking e-services linked to the justice sector, assessing the ability of users to 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.

The Survey assesses whether countries proactively utilize short message service (SMS) and mobile applications to share sector-specific public information and provide online services. As shown in figure 1.24, the number of countries providing information and services through smartphone applications, SMS and/or mobile browsers increased for all sectors by an average of 18 per cent between 2020 and 2022. The health sector saw the most significant increase (30 per cent), largely owing the widespread adoption of digital solutions in response to the COVID-19 pandemic, but growth was also evident for the justice sector (25 per cent), the education sector (22 per cent), and the social protection sector (20 per cent). The number of countries offering mobile services linked to specific sectors may be summarized as follows, in descending order of prevalence: health (135), education (128), employment (114), social protection (108), environment (103), and justice (100).

Figure 1.24 Number of countries using SMS and/or mobile applications for public information updates and services provision, by sector, 2020 and 2022
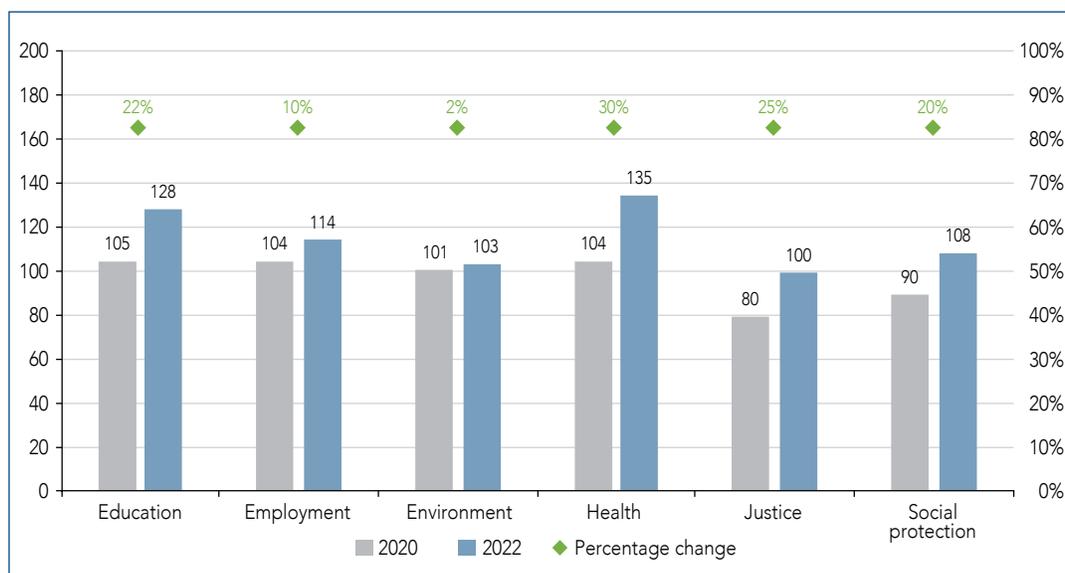
Sources: 2020 and 2022 United Nations E-Government Surveys.

At the regional level, Europe has the highest proportion of countries offering sector-specific mobile services (82 per cent), followed by Asia (73 per cent), the Americas (68 per cent), Oceania (32 per cent) and Africa (31 per cent) (see figure 1.25).

The continued expansion of mobile services delivery is linked to improved access to fixed (wired) broadband and a global average increase of almost 14 per cent in subscriptions for this service, a global average increase of 13 per cent in active mobile subscriptions, and a higher percentage of individuals using the Internet (see figure 1.26).

Figure 1.25   Percentage of countries offering sector-specific mobile services, by region, 2022
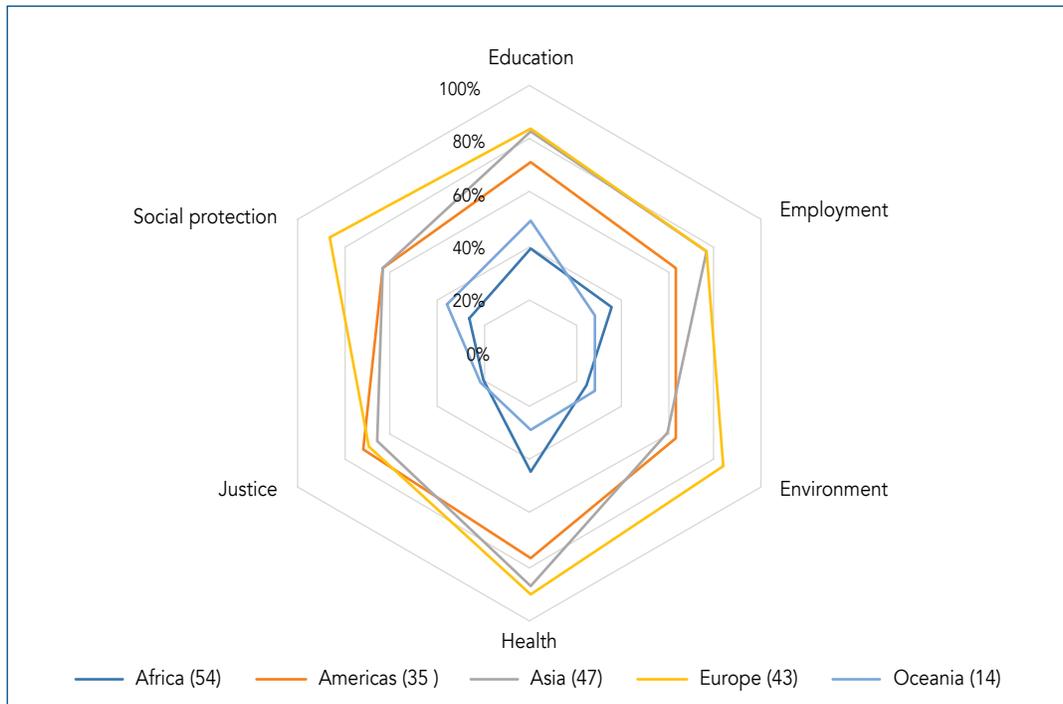
Source: 2022 United Nations E-Government Survey.

Figure 1.26   Share of the population using the Internet (2022) and percentage change in fixed (wired) broadband, active mobile broadband and mobile cellular subscriptions per 100 inhabitants (2020-2022), by region
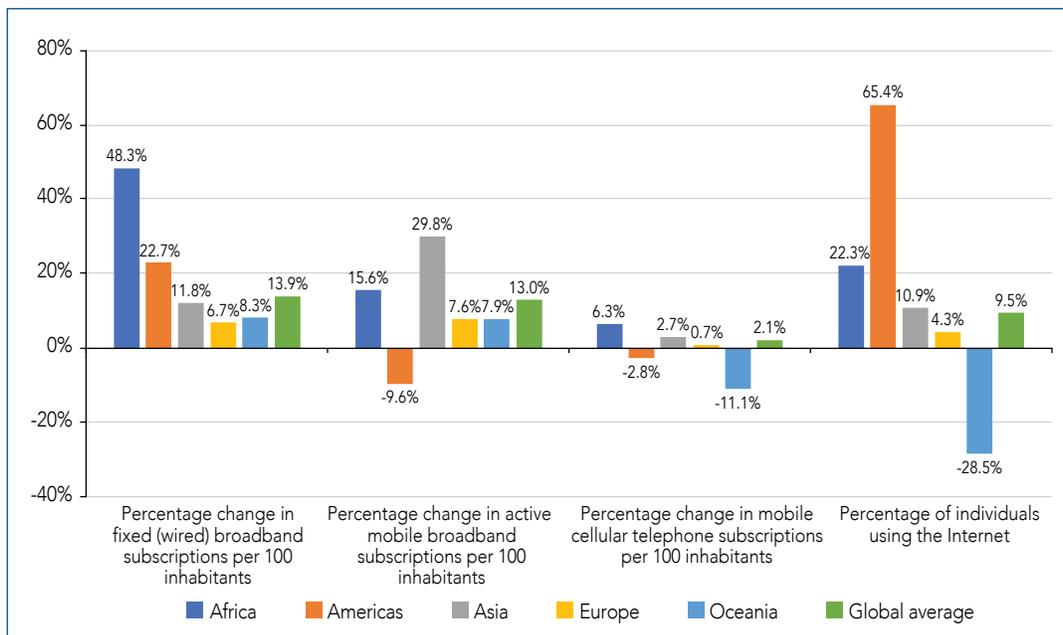
Source: 2022 United Nations E-Government Survey.

There has been an increase in fixed (wired) broadband subscriptions in all regions since 2020; the 48 per cent jump in Africa is noteworthy, though the subscription rate in this region remains the lowest by far at 2.7 subscriptions per 100 inhabitants (see table 1.9). Europe has the highest rate of fixed broadband use, at around 34.4 per 100 inhabitants, a slight increase from 32.2 in 2020. Over the past two years, the proportion of the population using the Internet has also risen in most regions, increasing by 65 per cent in the Americas, 22 per cent in Africa, 11 per cent in Asia, and 4 per cent in Europe. Oceania has registered a decline of 29 per cent in Internet usage and 11 per cent in mobile cellular telephone subscriptions. Europe is the leader in terms of active mobile broadband subscriptions per 100 inhabitants (98), followed by Asia (80) and the Americas (66).

Table 1.9   Percentage of the population using the Internet and fixed (wired) broadband, active mobile broadband, and mobile cellular telephone subscriptions per 100 inhabitants, by region, 2022

	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	
	2020	2022	2020	2022	2020	2022	2020	2022
Africa	1.8	2.67	37	42.77	78.7	83.68	27	33.01
Americas	14.2	17.43	73	65.96	104.9	101.92	41	67.81
Asia	10.9	12.19	62	80.50	103.1	105.93	57	63.21
Europe	32.2	34.37	91	97.90	113.1	113.86	82	85.52
Oceania	7.2	7.80	40	43.15	81.6	72.53	61	43.59
Global average	13.26	15.10	60.6	68.47	96.28	98.32	54	59.14

Source: International Telecommunication Union, Statistics (2020 and 2022), available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

As indicated in figure 1.27, the cost of mobile broadband subscriptions as a percentage of gross national income per capita remains significantly higher in Africa than in other parts of the world, contributing to the digital divide.

Figure 1.27   The cost of active mobile broadband subscriptions as a percentage of gross national income per capita, by region, 2022

Source: International Telecommunication Union, Statistics (2022), available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.
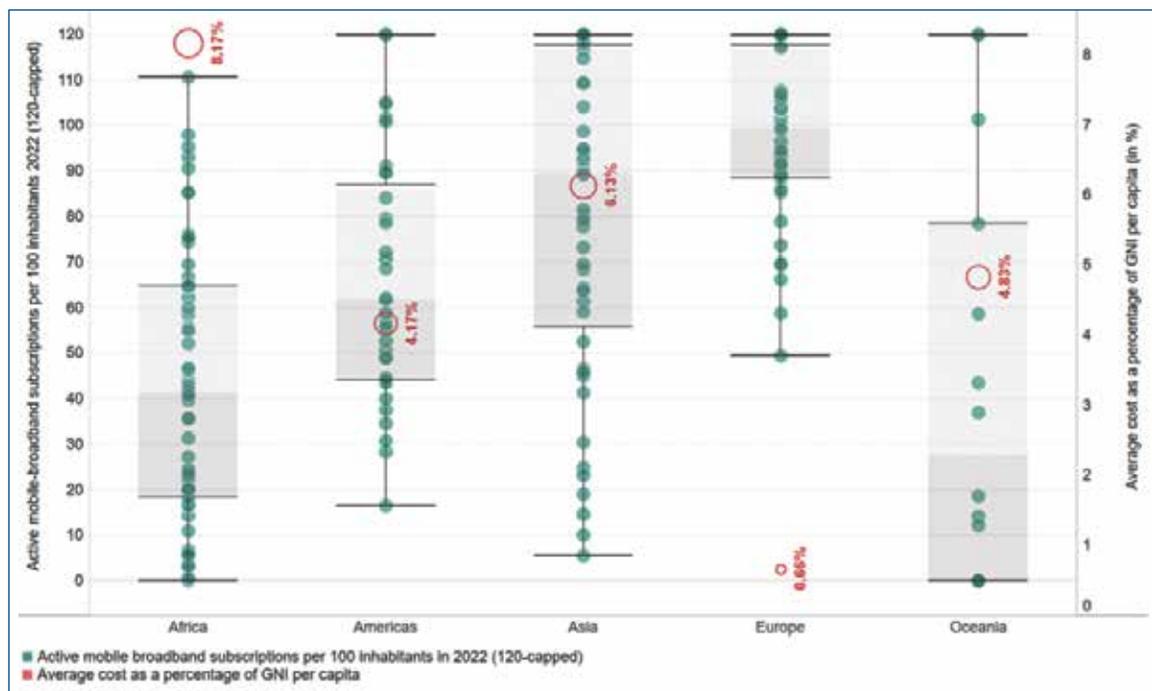
1.8.4   Technology subindex

At the time the countries were assessed for the 2022 Survey, all but three (Belize, Eritrea and Mauritania) had national portals.[3] Most of the government portals (98 per cent) can be found by search engines, have a "contact us" page, and utilize Hypertext Transfer Protocol Secure (HTTPS) to provide a safe experience for users (see figure 1.28). In 94 per cent of the countries assessed, the portals have a basic search feature on the homepage; only 58 per cent offer "advanced search" options. Most portals are developed using responsive web design (88 per cent), are updated at least once a month (82 per cent), have a sitemap (71 per cent), and include a section that provides help or addresses frequently asked questions (71 per cent); fewer countries (58 per cent) have portals that offer tutorials or guidance to ensure that people understand how use the services offered.

In 2022, for the first time, the Survey has assessed whether individuals and businesses are able to use the national portal to access or modify any data the government has on record that pertains to them. The findings indicate that 65 per cent of the countries surveyed allow businesses to access their data online, with 64 per cent giving individuals the same right. Modifying data is possible for business entities in 58 per cent of the countries and for individuals in 50 per cent of the countries surveyed.

In 112 countries (58 per cent of the Member States), users can save specific service transactions initiated on the portal and access them later, and in 109 countries (57 per cent), they can also access a list of previous transactions. Users can customize or personalize the national portal or bookmark their favourite or most frequently used online services in only 31 countries (16 per cent). In 51 countries (26 per cent), portals have begun to feature AI-enabled chatbot functionality.

Figure 1.28   Number of Member States with the assessed portal features, 2022

Source: 2022 United Nations E-Government Survey.

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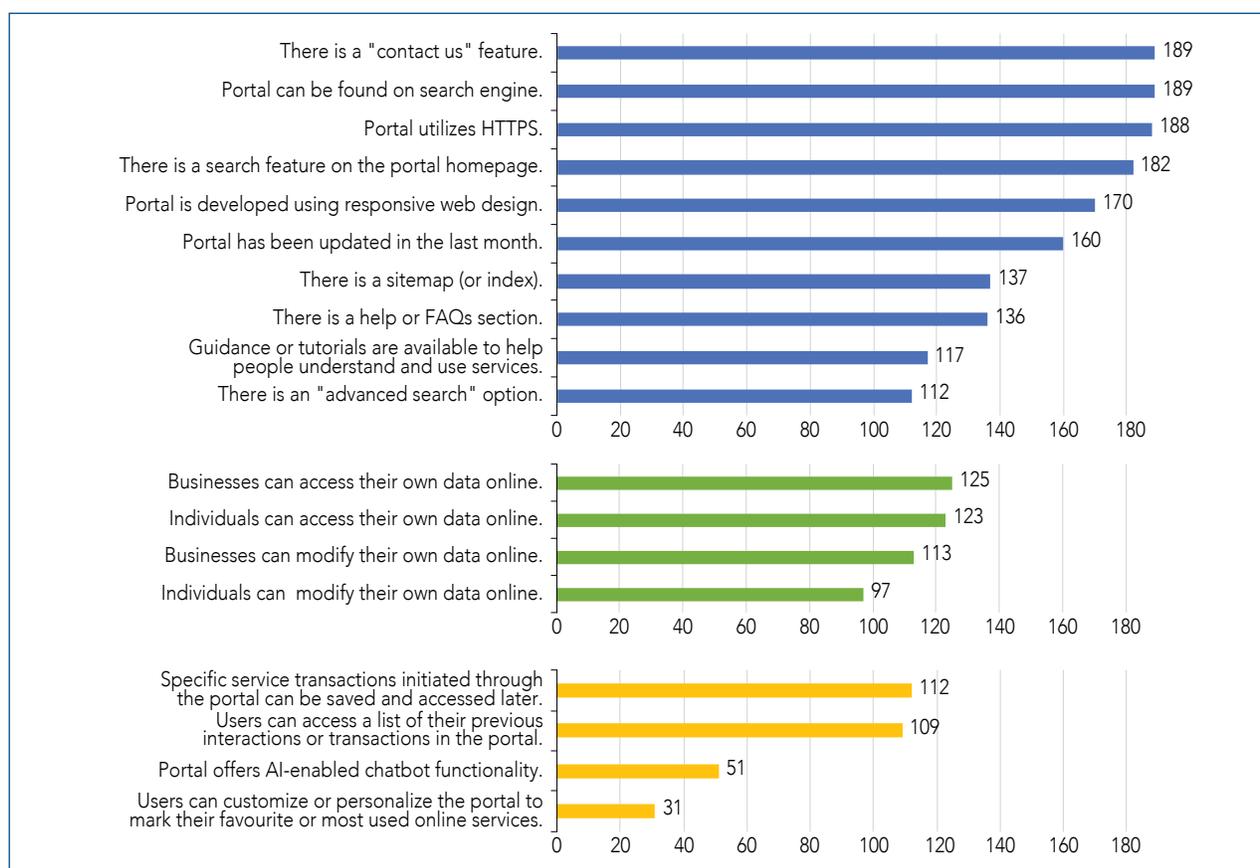
1.8.5 Institutional framework subindex

Many aspects of the institutional framework supporting e-government development have always been assessed in the Survey, generally as part of the broader analysis, but the 2022 edition features a new OSI subindex that focuses exclusively on the institutional framework. Some relevant analytical findings are presented below.

Almost all of the Member States have national portals that are fully operational. The vast majority of countries (93 per cent) make the government organizational chart and information on the government structure available on their portals, 90 per cent provide the names and titles of the heads of government agencies, departments and ministries, 77 per cent furnish information on the national CIO or the equivalent, and 74 per cent share links to subnational or local government agencies. Such information helps orient users and allows them to engage effectively with government agencies through online platforms.

An average of 90 per cent of the countries surveyed have national portals that provide links to ministerial websites and offer sources of information on sector-specific policies (see figure 1.29).

Figure 1.29   Number of countries with links to sectoral ministries and policies on their national portals, 2022

Link to sectoral or ministerial websites

Education	182
Employment	165
Environment	176
Health	179
Justice	174
Social Protection	163

Information on sector-specific policies

Education	182
Employment	174
Environment	179
Health	179
Justice	168
Social Protection	173
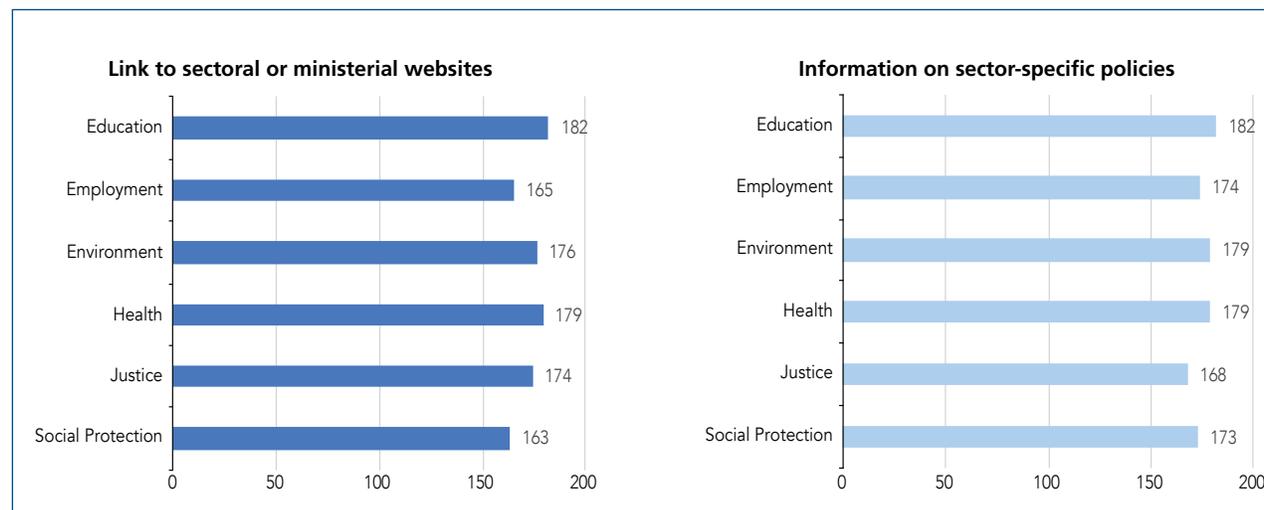
Source: 2022 United Nations E-Government Survey.

Among the key elements of a conducive e-government ecosystem are a legislative framework that regulates digital transformation and legal mechanisms that ensure access to public information and compliance with online privacy protocols. According to 2022 Survey data, 132 countries (68 per cent) have legislation guaranteeing freedom of information and access to information, and 127 countries (66 per cent) have privacy statements available on their government portals. As illustrated in figure 1.30, most countries have a national electronic or digital government strategy (155), a national data policy or strategy (128), and legislation on cybersecurity (153), personal data protection (145), and open government data (117); 91 countries, or almost half of those surveyed, have laws relating to e-participation.

Figure 1.30   Legislative framework for e-government development, 2022

Legislation, policies or regulations on cybersecurity — 153
Availability of a national e-government/digital government strategy or equivalent — 150
Legislation, policies or regulations on personal data protection — 145
Availability of national data strategy or policy — 128
Legislation, policies or regulations on open government data — 117
Legislation, policies or regulations on e-participation — 91
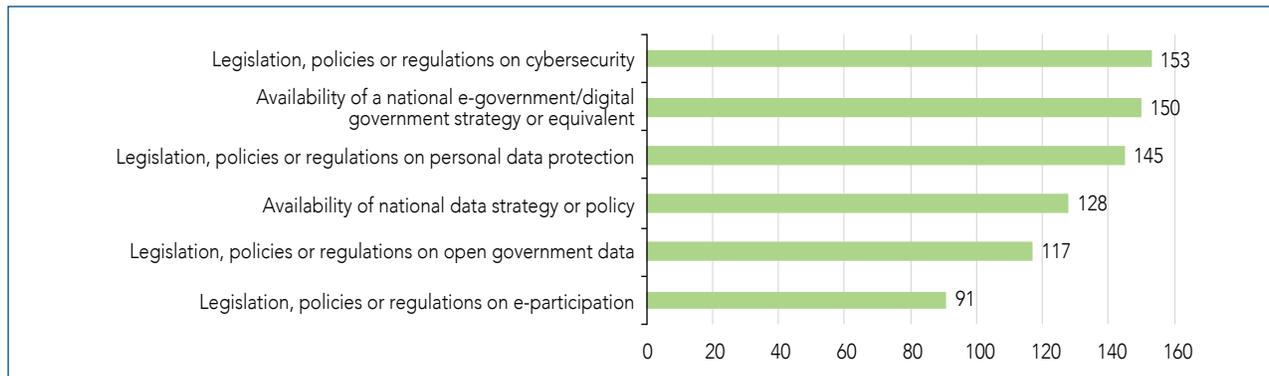
Source: 2022 United Nations E-Government Survey.

1.8.6   Content provision subindex: sharing public information

The availability of government information and services in multiple languages or through multiple channels facilitates access and inclusiveness. As shown in figure 1.31, more than 80 per cent of the Member States (158) have portals with content available in more than one official language. Fewer than half of the countries assessed (91) proactively share web statistics on usage such as the number of new visits, total page views, or average time spent on site on their national portals.

Figure 1.31   Content provision on national portals, 2022 (Number of countries)

Availability of portal content in more than one official language of the country. — 158
Web statistics on usage, such as new visits, total page views, and average time on site. — 91
Announcements of forthcoming procurement or bidding processes are published on the portal. — 171
Information is available about payments for government services through channels other than online. — 143
Information is provided about results of any government procurement or bidding process online. — 139
Information is avalable if online services are provided in partnership with the private sector. — 112
Free access to government online services is provided through kiosks, community centres, post offices, libraries, public spaces, or free Wi-Fi. — 103

Source: 2022 United Nations E-Government Survey.

The majority of countries (171) publish announcements of forthcoming procurement or bidding processes on their national portals, but only 139 countries provide online information about the results of those processes.

In 143 countries, Governments inform portal users about alternatives to paying for government services online, but only 103 countries (53 per cent) provide information about and/or free access to online government services via kiosks, community centres, post offices, libraries, public spaces or free Wi-Fi. Most countries (112) inform people about partnership arrangements with the private sector for the online delivery of public services.

1.8.7 E-participation subindex

Public participation is a key dimension of governance, and its importance is highlighted in a number of SDG indicators and targets, including target 16.7, which calls for ensuring "responsive, inclusive, participatory and representative decision-making at all levels". The use of information and telecommunications technology to engage people in public decision-making and services delivery is an essential part of e-government, and since 2001 the Survey has regularly tracked developments in e-participation as reflected in the relevant features of national e-government portals and websites. The E-Participation Index (EPI) assesses online participation utilizing a three-point scale that distinguishes between the provision of information (whereby the Government provides information to people), consultation (whereby the Government consults on policy or on services delivery at different stages of the process and possibly provides feedback), and decision-making (whereby the Government involves people in decision-making).[4]

For the 2022 Survey, the methodology for measuring e-participation has been improved to better assess engagement between the Government and the people in consultation and decision-making processes. More specifically, government portals and websites have been assessed for the integration of participatory budgeting or similar mechanisms; the availability of open government data (OGD) in general and in six key sectors linked closely to SDG implementation (education employment, environment, health, justice and social protection); evidence of co-creation or co-production mechanisms for collaborative services provision; evidence that people's voices are heard in discussions and decision-making processes linked to the formulation and adoption of policies on issues relating to vulnerable populations; and evidence of online consultations (via e-forums, e-polls, e-questionnaires, or other e-participation tools) that are designed to facilitate the engagement of people in vulnerable situations.

This subsection assesses e-participation as reflected in EPI levels and rankings, highlighting quantitative findings, changes over time, and differences between countries and regions. The correspondence between EPI and EGDI levels is also explored.

The eight countries with the highest EPI rankings are listed in table 1.10. Top-ranked Japan has an EPI value of 1.0, signifying that all e-participation features assessed in the Survey are present in the country's portal. Australia is ranked second, Estonia and Singapore are tied for third, and the Netherlands is ranked fifth. Finland, New Zealand and the United Kingdom are all ranked sixth in the 2022 EPI. Table 1A in annex A shows the EPI levels for all 193 Member States and indicates any movement that has occurred between EPI groups since 2020.

Table 1.10   Countries ranked highest in the 2022 E-Participation Index

EPI rank in 2022	Country	EPI value in 2022	EPI rank in 2020	Change in EPI rank from 2020 to 2022
1	Japan	1.0000	4	+3
2	Australia	0.9886	9	+7
3	Estonia	0.9773	1	- 2
3	Singapore	0.9773	6	+3
5	Netherlands	0.9659	9	+4
6	Finland	0.9545	14	+8
6	New Zealand	0.9545	4	-2
6	United Kingdom of Great Britain and Northern Ireland	0.9545	6	0

Source: 2022 United Nations E-Government Survey.

Generally, countries with higher EGDI values also have higher EPI values; the 27 countries with very high EPI values have EGDI values ranging from 0.7524 to 0.9717 (see figure 1.32). It is possible, however, for countries to have disparate EGDI and EPI values. For instance, Belgium, Slovakia, Bahrain and Belarus have very high EGDI values (above 0.75), yet their EPI values average 0.4488. There is a sizeable group of countries (Andorra, Antigua and Barbuda, Azerbaijan, Bahamas, Barbados, Bhutan, Plurinational State of Bolivia, Brunei Darussalam, Cabo Verde, Cambodia, Côte d'Ivoire, Dominican Republic, Egypt, El Salvador, Ghana, Guatemala, Jamaica, Lebanon, Maldives, Mauritius, Montenegro, Morocco, Namibia, Nicaragua, Philippines, Qatar, Saint Lucia, Saint Vincent and the Grenadines, Sri Lanka, Tajikistan, Tonga and Zambia) that have high EGDI values (0.50-0.75) but an average EPI value of 0.3636. Another 18 countries with high EGDI values (Algeria, Belize, Botswana, Dominica, Fiji, Gabon, Grenada, Guyana, Islamic Republic of Iran, Monaco, Nepal, Palau, Saint Kitts and Nevis, San Marino, Seychelles, Suriname, Trinidad and Tobago, and Bolivarian Republic of Venezuela) have low EPI levels ranging between 0.0909 and 0.2386, suggesting that government efforts to actively engage people in collaborative governance is limited.

Figure 1.32   Distribution of 193 Member States based on EGDI and EPI values, 2022
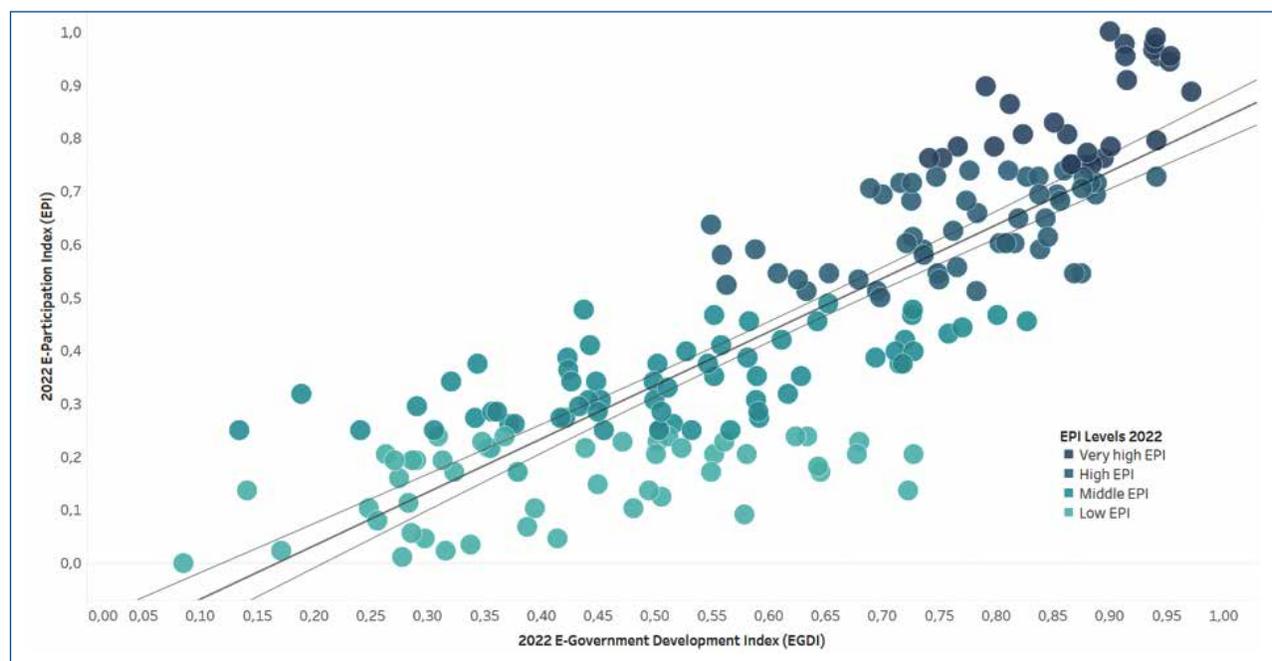
Source: 2022 United Nations E-Government Survey.

While most countries are committed to improving the provision of online services and user experiences, government efforts to actively engage the public in e-consultations and other forms of e-participation remain somewhat limited. As shown in figure 1.33, the proportions of countries offering options for users to provide feedback about the government website, to file a complaint, or to report corruption by public servants or institutions have steadily increased since 2018, reaching 66, 63 and 74 per cent, respectively, in 2022.

Figure 1.33 Percentage of countries offering e-participation tools for leaving feedback, reporting public corruption, and filing a complaint, 2018, 2020 and 2022
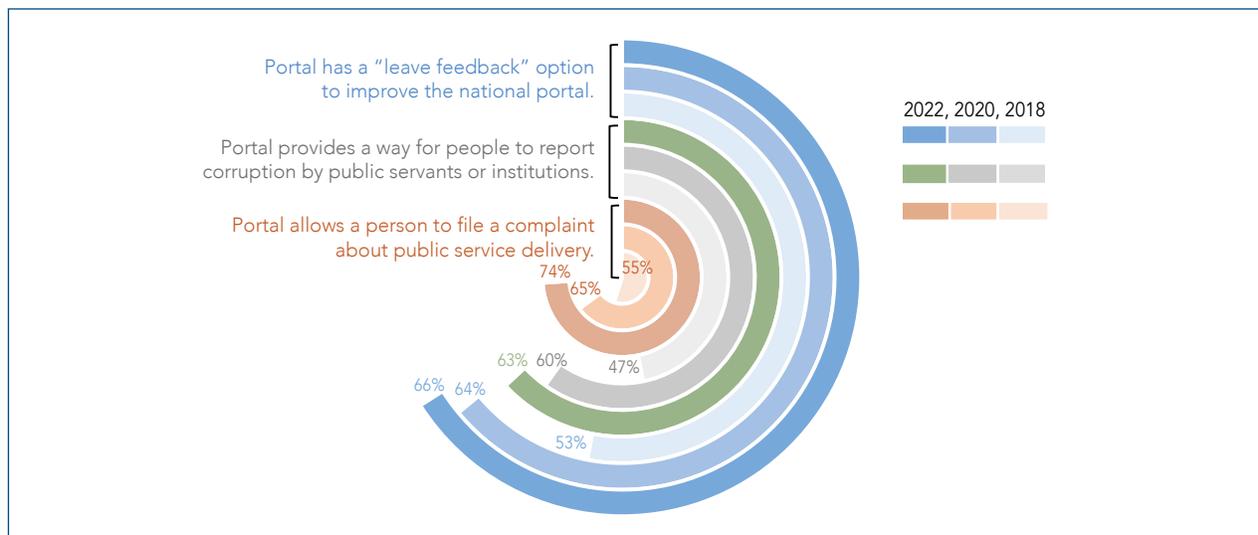
Source: 2022 United Nations E-Government Survey.

Social networking tools are offered on government portals in 89 per cent of the Member States, but significantly lower proportions of countries announce e-participation activities (49 per cent) and integrate mechanisms for e-consultations (52 per cent); as figure 1.34 illustrates, the numbers of countries offering these three options increased for one indicator but declined for the other two.

Figure 1.34   Number of countries with portals that integrate calendar announcements, consultation mechanisms and social networking tools, 2020 and 2022
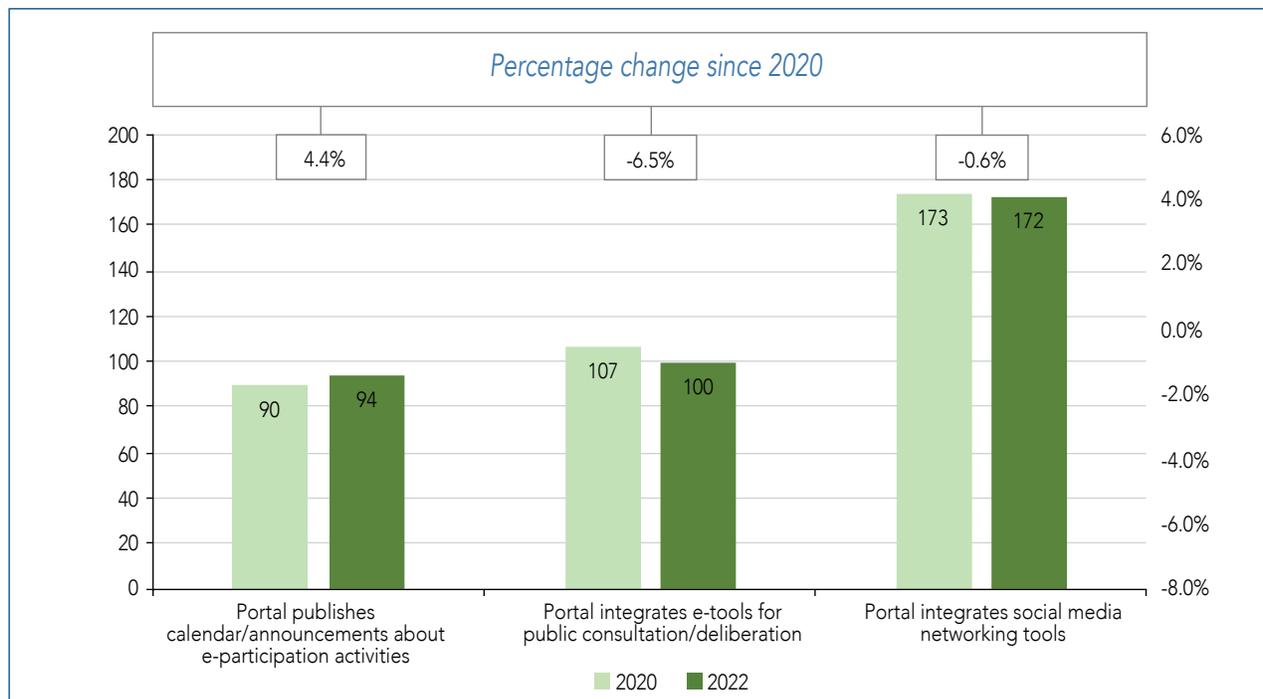
Source: 2022 United Nations E-Government Survey.

At the regional level, Europe has the highest proportion of countries that provided evidence of having conducted at least one e-consultation in the 12 months preceding the administration of the Survey (91 per cent), followed by Asia (70 per cent), the Americas (60 per cent), Africa (24 per cent) and Oceania (14 per cent) (see figure 1.35).

Figure 1.35   Percentage of countries with evidence of at least one e-consultation held within the past 12 months, by region, 2020 and 2022
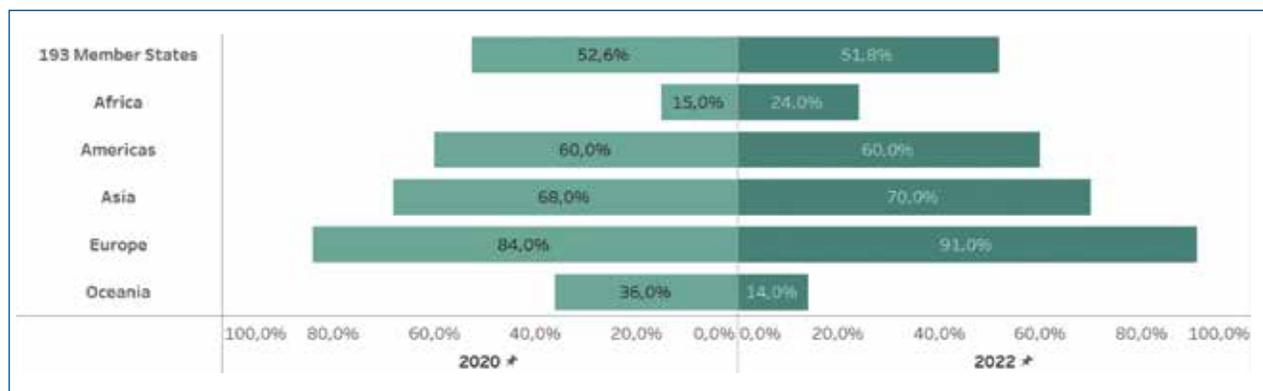
Source: 2022 United Nations E-Government Survey.

1.9   E-government during COVID-19: ad hoc services

Since the COVID-19 pandemic began unfolding in early 2020, digital technologies have allowed Governments to play a key role in addressing the challenges surrounding the global health crisis and have created or reinforced essential connections during a period of growing isolation. Specifically, digital technologies have been used to facilitate collaborative research, the sharing of knowledge, and the provision of transparent guidance to a wide range of public and private stakeholders. Governments have connected with members of the public online by sharing information, providing services, and developing applications to track the evolution of the pandemic and coordinate the logistics surrounding remediation-focused activities such as lockdowns and vaccine administration. E-government has become an essential tool for communication and collaboration between policy makers and society during the COVID-19 pandemic. Digital technologies have 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 for those who need them the most (see chapter 5 for more detailed information).

Given the impossibility of evaluating all measures taken by Governments to address COVID-19-related challenges, the present Survey has assessed the provision of selected online services aimed at mitigating the effects of the pandemic in key areas of health and education, with a focus on leaving no one behind. The Survey has captured the efforts of Governments to ensure that systems have been put in place to provide information and services relating to a number of priority areas, including distance learning, telehealth services, and scheduling for vaccinations and medical tests (see figure 1.36).

The findings indicate that over the past two years, 90 per cent of the Member States have established dedicated portals or created space in their national portals to address the COVID-19 pandemic. Governments in 141 countries currently offer distance learning platforms or related information. In 99 of the countries surveyed, residents can learn about telehealth services and can often schedule sessions through government portals. In 156 countries Governments provide COVID-19 vaccine information and scheduling services, and in 102 countries the platform can also be used to obtain information on or schedule medical tests.

Figure 1.36   Number of countries that have implemented assessed COVID-19 response measures, 2022

Distance learning options
- ■ Provides online platform for distance learning
- ■ Provides information about distance learning solutions

Availability of telehealth services
- ■ Has both information and online scheduling options available
- ■ Can schedule telehealth sessions
- ■ Provides information about available telehealth services

Online scheduling for vaccinations
- ■ Has both information and online scheduling options available
- ■ Can schedule vaccinations
- ■ Provides vaccination information

Online scheduling for medical tests
- ■ Has both information and online scheduling options available
- ■ Can schedule medical tests
- ■ Provides information about availability of medical tests

Source: 2022 United Nations E-Government Survey.

More than 90 per cent of the countries in Europe have implemented all four of the measures assessed, offering the public distance learning support, telehealth services, and online scheduling for vaccinations and other medical tests (see figure 1.37). Over 70 per cent of the countries in Asia and the Americas provide such services, and the corresponding proportions for Africa and Oceania are 41 and 40 per cent, respectively.

Figure 1.37 The implementation of COVID-19 response measures, by region, 2022 (Percentage of countries)
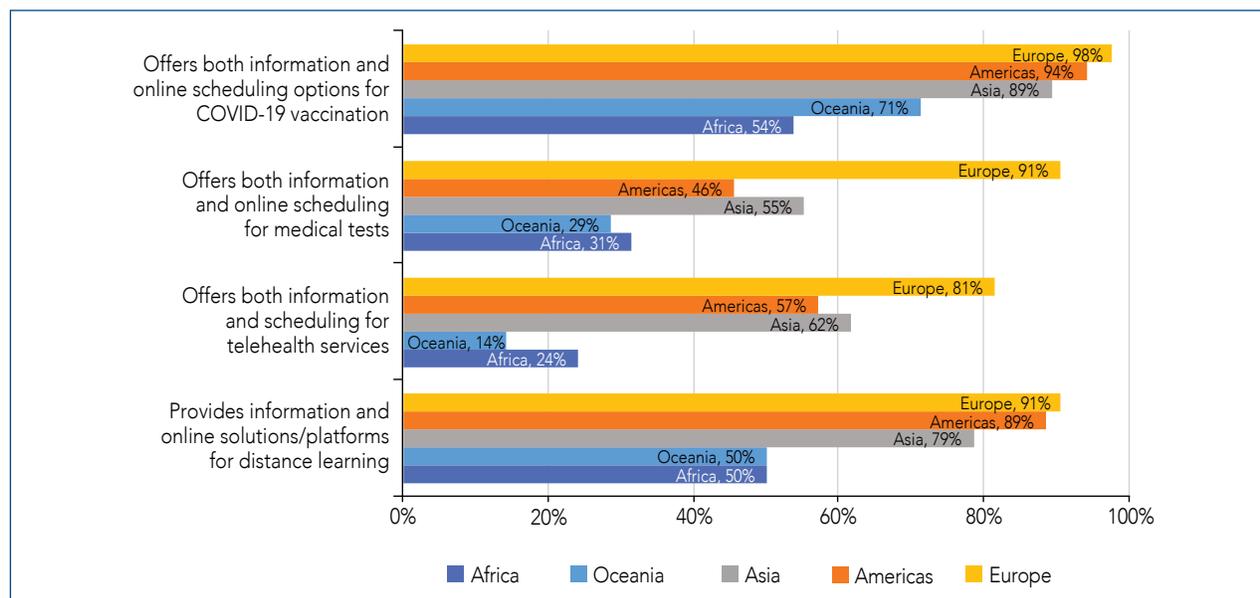
Source: 2022 United Nations E-Government Survey.

1.10   Summary and conclusion

The slight increase in the average EGDI value for 2022 is largely attributable to the progress made in strengthening telecommunications infrastructure and developing human capital. Countries in Africa have made significant improvements in their telecommunications infrastructure, building a solid foundation for accelerating the transition to digital government. Challenges remain, however, as the cost of mobile broadband subscriptions as a percentage of per capita gross national income remains significantly higher in Africa than in other parts of the world. Digital divides persist and may widen without the adoption of targeted and systematic measures to assist low-income and lower-middle-income countries and countries in special situations (including LDCs, LLDCs and SIDS). Presently, all seven countries in the low EGDI group are LDCs and/or LLDCs in Africa.

While advancement in e-government development remains strongly correlated with national income, there are some notable exceptions. Of the 99 Member States that have EDGI values above the 2022 average, nearly 90 per cent are in the high-income or upper-middle-income group; however, the remaining 10 per cent (11 countries) are in the lower-middle-income group and often have underdeveloped telecommunications infrastructure. The Survey data confirm that income level matters but is not the sole factor determining the level of e-government development.

The number of countries providing at least 1 of the 22 online services assessed has increased by 16.7 per cent globally, with 61 per cent of the Member States offering more than 16 services. There is a clear trend towards the full digitalization of government services, giving users the ability to complete virtually all types of transactions entirely online. More than a quarter of the Member States have integrated AI-enabled chatbot functionality in their portals.

Driven by the COVID-19 pandemic, government priorities in online services provision have centred on health, education and social protection. At the regional level, 90 per cent of the countries in Europe and 70 per cent of the countries in Asia and the Americas are providing a wide range of online services to address the COVID-19 pandemic, offering information and tools that facilitate distance learning, telehealth services, and the scheduling of vaccines and medical tests. The sharpest increase in online services provision has been in the area of social protection; the number of countries with national portals that allow users to apply for benefits such as maternity care, child subsidies, pensions, housing, and food allowances has grown by 17 per cent since 2020.

A growing number of countries have strengthened their institutional and legal frameworks for e-government development. Most countries have a national electronic or digital government strategy, as well as legislation on cybersecurity (153 countries), personal data protection (145 countries), national data policy (128 countries), open government data (117 countries), and e-participation (91 countries). Individuals and businesses are increasingly able to interact with public institutions through online platforms, obtain information on legislation relating to freedom of information, and access public content and data (including open government data). More Governments are seeking and responding to user feedback and are working to tailor services to people's needs. However, proactive engagement in public e-consultations on important policy issues remains limited; Survey results show that only about half of the Member States meet this indicator, though regional averages vary. The region with the highest number of countries engaging in online public consultations is Europe (90 per cent), followed by Asia (70 per cent) and the Americas (60 per cent). Only 24 per cent of countries in Africa and 14 per cent of countries in Oceania conduct e-consultations.

The key takeaways from the chapter are provided below.

General observations

- The global EGDI average has increased slightly, largely owing to improvements in telecommunications infrastructure and human capital development.

- Among the four EGDI subgroups, the Member States with high EGDI values make up the largest share (38 per cent), followed by those with very high EGDI values (31 per cent) and those with middle EGDI values (27 per cent). The proportion of countries with low EGDI values remains the same as in 2020 (4 per cent), though the number of countries at this level dropped from eight to seven. All countries with low EGDI values (below 0.25) are LDCs and/or LLDCs in Africa.

- The movement of countries between EGDI groups over the past two years has mainly been between the top quartile of one EGDI group and the lowest quartile of the next higher group. Fourteen countries have moved to a higher EGDI group, and three countries have moved to a lower EGDI group.

- EGDI values tend to be higher for higher-income countries than for lower-income countries. Nevertheless, many countries have achieved high and very high levels of e-government development by improving their online services provision (expressed as an OSI value) despite limited resources. For example, India and Rwanda have very high OSI levels (0.7934 and 0.7935, respectively) even though their telecommunications infrastructure is relatively underdeveloped.

- Almost 90 per cent of the 99 Member States with above-average EDGI values are in the high-income or upper-middle-income group; the remaining 10 per cent (11 countries) are in the lower-middle-income group.

- The most dramatic increase in the average EGDI value (8.6 per cent) and subindex values has occurred in the upper-middle-income group.

- TII values have risen for all income groups, with the greatest increase registered by the upper-middle-income group (12.3 per cent), followed by the lower-middle-income group (7.3 per cent), the low-income group (6.4 per cent), and the high-income group (1 per cent).

- While national income levels are generally consistent with EGDI and OSI values, there are some notable exceptions. Palau and Nauru are high-income countries with below-average EGDI values because their underdeveloped infrastructure (typical of SIDS) translates into relatively low TII subindex values. Conversely, some low-income countries (such as Rwanda) have done exceedingly well in online services development.

- High-income countries have already reached a relatively high level of services provision, whereas low-income and lower-middle-income countries lack sufficient resources for investment in the development of online services. Low-income countries struggle with investing in human capital development and are the only group to have registered a decline in the average HCI index value between 2020 and 2022.

- With their higher OSI, TII and HCI values, upper-middle-income countries will likely make rapid progress in e-government ecosystem development in the coming years, while the decline in OSI or HCI values for low-income and lower-middle-income countries may signify deepening digital divides.

Online services provision

- The number of countries providing the online services assessed in the Survey has risen by an average of 5 per cent since 2020. The number of countries offering services that allow users to apply for social protection programmes such as maternity care, child subsidies, pensions, and housing and food allowances has seen the most significant increase (17 per cent), which may have occurred in response to the COVID-19 pandemic.

- The number of countries offering at least 1 of the 22 online transactional services assessed increased from 162 in 2020 to 189 in 2022, or by 16.7 per cent. The provision of 16 types of services is the global average, but 115 of the Member States (61 per cent) offer more.

- Almost three quarters of the Member States (138 countries) use "one-stop-shop" portals for the online provision of different government services.

- Business-related services such as registration, licensing and filing company taxes are among the five government services offered most frequently.

- The 2022 Survey includes a new indicator assessing whether national portals are set up for the submission of business tax forms and payments online, similar to the services offered to individuals for income tax and Value Added Tax (VAT) submissions. The data suggest that tax filing services are offered more frequently to businesses (153 countries) than to individuals (151 countries for income tax and 142 countries for VAT).

- The next most commonly offered online services include applying for government vacancies and business licences, requesting birth, death, and marriage certificates, and paying utility bills.

- Among the least offered online services are paying fines (118 countries), applying for a visa (97 countries), making declarations to the police (92 countries), registering motor vehicles (77 countries), and submitting a change of address (75 countries).

- Among the countries with very high OSI values, coverage of the 22 services assessed is nearly universal (averaging 93 per cent for the 54 countries in this group).

- Countries with high OSI values have strong online services coverage as well (averaging 83 per cent for the 50 countries in this group).

- The proportions are significantly lower for the remaining OSI groups, with coverage averaging 58 per cent for the 70 countries in the middle OSI group and 20 per cent for the 19 countries in the low OSI group. Around three quarters of the countries in the low OSI group (14 of the 19) are LDCs, LLDCs and/or SIDS.

- Progress is being made in online services delivery even in countries with low OSI levels, where the average number of online services offered rose from 1 in 2018 to 4.5 in 2022. Within the low OSI group, Equatorial Guinea offers the highest number of online services (14).

- The Survey findings indicate that the majority of countries use their portals just to provide information or offer only partially digitalized services, with users still needing to appear at government offices in person to complete most transactions. There is, however, a clear push towards higher levels of digitalization whereby users will no longer have to download or print forms but can complete their transactions fully online.

- Countries tend to assign priority to digitalizing the registration and licensing of businesses and the process of applying for government vacancies; more than half of the countries offering such services have them fully digitalized.

- Of the 131 countries allowing users to apply for social protection programmes online, 74 (56 per cent) have systems in place that allow all relevant transactions to be fully completed online.

- E-procurement portals and digital invoices are far more common in high-income and upper-middle-income countries than in lower-middle-income countries, and these features are much less prevalent in low-income countries. For comparison, 8 out of 10 high-income countries are likely to have both a dedicated platform and a reliable system for digital invoicing, while the same is true for only 4 out of 10 lower-income countries.

- The number of countries providing information and services through smartphone applications, SMS and/or mobile browsers increased for all sectors by an average of 18 per cent between 2020 and 2022. The health sector saw the most significant increase (30 per cent), largely owing the widespread adoption of digital solutions in response to the COVID-19 pandemic, but growth was also evident for the justice sector (25 per cent), the education sector (22 per cent) and the social protection sector (20 per cent).

- There has been an increase in fixed (wired) broadband subscriptions in all regions since 2020; the 48 per cent jump in Africa has been accompanied by a 22 per cent increase in Internet use, offering a solid foundation for accelerating the transition to digital government in that region.

- The cost of mobile broadband subscriptions as a percentage of gross national income per capita remains significantly higher in Africa than in other parts of the world, contributing to the digital divide.

- The findings indicate that 65 per cent of the countries surveyed allow businesses to access their data online, with 64 per cent giving individuals the same right. Modifying data is possible for business entities in 58 per cent of the countries and for individuals in 50 per cent of the countries surveyed.

- In 112 countries (58 per cent of the Member States), users can save specific service transactions initiated on the portal and access them later, and in 109 countries (57 per cent), they can also access a list of previous transactions. Users can customize or personalize the national portal or bookmark their favourite or most frequently used online services in only 31 countries (16 per cent).

- In 51 countries (26 per cent), portals have begun to feature AI-enabled chatbot functionality.

Institutional framework

- Almost all of the Member States have national portals that are fully operational. The vast majority of countries (93 per cent) make the government organizational chart and information on the government structure available on their portals, 90 per cent provide the names and titles of the heads of government agencies, departments and ministries, 77 per cent furnish information on the national CIO or the equivalent, and 74 per cent share links to subnational or local government agencies. Such information helps orient users and allows them to engage effectively with government agencies through online platforms.

- An average of 90 per cent of the countries surveyed have national portals that provide links to ministerial websites and offer sources of information on sector-specific policies.

- According to 2022 Survey data, 132 countries (68 per cent) have legislation guaranteeing freedom of information and access to information, and 127 countries (66 per cent) have privacy statements available on their government portals.

- Most countries have a national electronic or digital government strategy (155), a national data policy or strategy (128), and legislation on cybersecurity (153), personal data protection (145), and open government data (117); 91 countries, or almost half of those surveyed, have laws relating to e-participation.

E-Participation

- Generally, countries with higher EGDI values also have higher EPI values; the 28 countries with very high EPI values have EGDI values ranging from 0.7409 to 0.9712.

- It is possible for countries to have disparate EGDI and EPI values. For instance, Belgium, Slovakia, Bahrain and Belarus have very high EGDI values (above 0.75), yet their EPI values average 0.4488.

- The majority of countries are committed to improving the provision of online services and user experiences; presently, between 63 and 73 of the Member States offer options for users to provide feedback about the government website, file a complaint, or report corruption by public servants or institutions.

- Government efforts to actively engage the public in e-consultations and other forms of e-participation remain somewhat limited. Only 48 per cent of the countries surveyed announce e-participation activities, and just 52 per cent integrate mechanisms for e-consultations.

- At the regional level, Europe has the highest proportion of countries that provided evidence of having conducted at least one e-consultation in the 12 months preceding the administration of the Survey (91 per cent), followed by Asia (70 per cent), the Americas (60 per cent), Africa (24 per cent) and Oceania (14 per cent).

COVID-19 measures and responses

- Over the past two years, 90 per cent of the Member States have established dedicated portals or created space in their national portals to address the COVID-19 pandemic. Governments have worked to ensure that systems are in place to provide information and services relating to a number of priority areas, including distance learning, telehealth services, and scheduling for vaccinations and medical tests.

- More than 90 per cent of the countries in Europe have implemented all four of the measures assessed, offering the public distance learning support, telehealth services, and online scheduling for vaccinations and other medical tests. Over 70 per cent of the countries in Asia and the Americas provide such services, and the corresponding proportions for Africa and Oceania are 41 and 40 per cent, respectively.

Overall, the Survey findings indicate that progress is being made in e-government development globally but at a slower pace than anticipated. The COVID-19 pandemic has heightened the importance of digital transformation, not least because Governments must be able to deliver public services despite restrictions on physical interaction and to reach remote, marginalized, vulnerable and other underserved populations so that no one is left behind. Countries that are already at a more advanced stage of e-government development tend to perform better in public services delivery than those with resource limitations or underdeveloped telecommunications infrastructure and human capital development. Without the adoption of targeted, systematic measures to assist low-income and lower-middle-income countries and countries in special situations (including LDCs, LLDCs and SIDS), digital divides may continue to widen.

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 2022 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]   During the assessment period (June-September 2021), the Government of Belize was in the process of redesigning its national portal; however, many ministerial websites were functional, and the Survey assessed e-government features based on those available government websites.

[4]   The description of the three-point scale is extracted from United Nations, *E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development* (Sales No. E.20.II.H.1), pp. 117-118.

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

Photo credit: pixabay.com

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 but one (Oceania) have improved their average EGDI values since 2020 (see figure 2.1). Europe remains the leader in e-government development, with an average EGDI value of 0.8305. All of the countries in Europe have EGDI values above the global average of 0.6102; 81 per cent have very high EGDI values (above 0.75),[1] and the remaining 19 per cent have high EGDI values (between 0.50 and 0.75). Similar to the 2020 Survey, 8 of the 15 countries in the highest (VH) rating class of the very high EGDI group are in Europe.

Asia is in the second position in terms of regional average EGDI value (0.6493), followed by the Americas (0.6438), Oceania (0.5081) and Africa (0.4054). For the first time since 2016, the average EDGI value for Oceania declined (from 0.5269 in 2020 to 0.5081 in 2022, or by 3.6 per cent), largely owing to the 29 per cent drop in the average value of the Telecommunications Infrastructure Index (TII) for the region over the past two years.

Africa has made the most notable progress, with a 3.6 per cent increase in its average EGDI value, followed by Asia (1.9 per cent), Europe (1.7 per cent) and the Americas (1.5 per cent). TII value increases of 12 per cent in Africa, 6.5 per cent in the Americas and 4.6 per cent in Asia are largely responsible for the higher EGDI values in those regions. Despite the significant progress in Africa, the EGDI average for this region remains below the global average of 0.6102.

Europe has the lowest variance in country EGDI values (between 0.6256 and 0.9717), suggesting that the region is moving more rapidly than

Chapter 2

Figure 2.1   Regional average EGDI values, 2022

Source: 2022 United Nations E-Government Survey.

Figure 2.2   Regional distribution of EGDI levels and of OSI, HCI and TII subcomponent levels, 2022
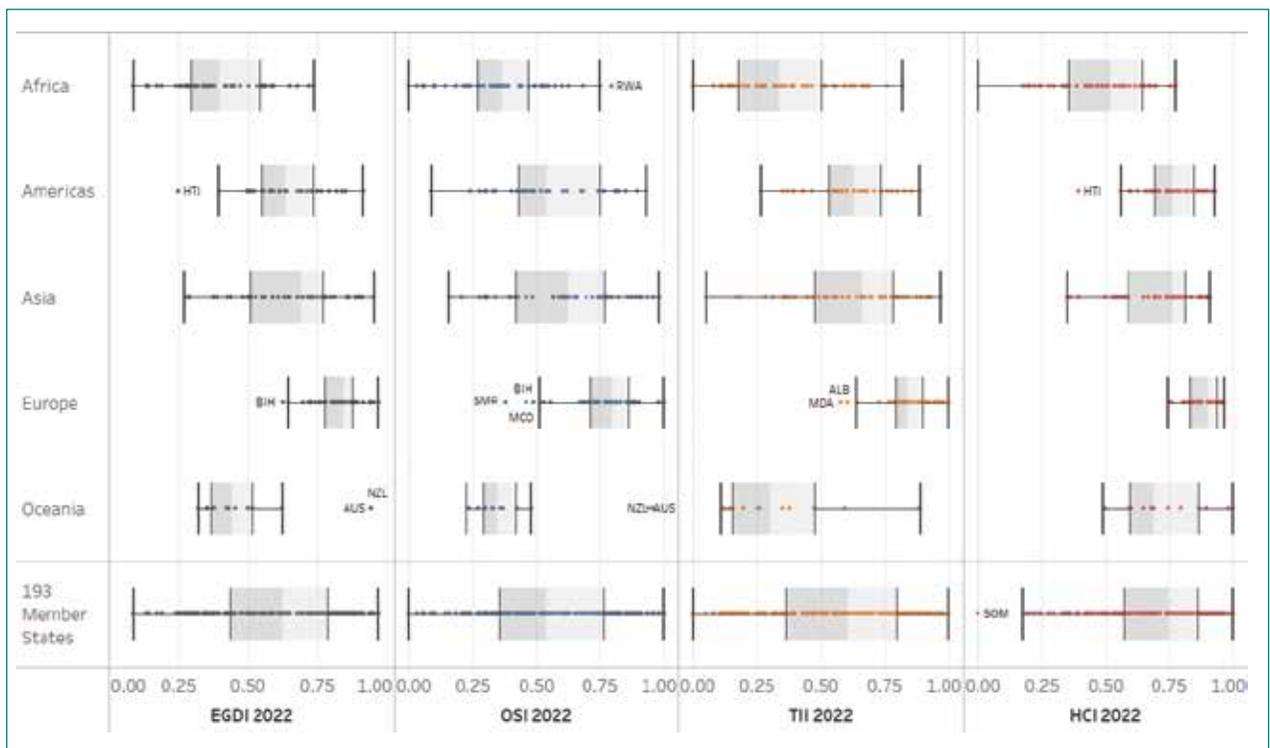
Source: 2022 United Nations E-Government Survey.

Note: The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

other regions towards convergence in the level of e-government development (see figure 2.3). In Oceania, EGDI values vary from 0.3230 to 0.9432, suggesting highly uneven e-government development. The high variance in Oceania is explained by the fact that while Australia and New Zealand are top performers, the majority (11 out of 14) of the remaining countries have EGDI values below the global average EGDI value of 0.6102. A similar high-variance situation prevails in Africa, where 4 of the 54 countries have EGDI values above the global EGDI average but the remainder have values that are sometimes significantly lower, highlighting gaps in e-government development and the persistence of the digital divide. These regional e-government development patterns are consistent with those in the 2020 Survey.

Asia and the Americas are roughly comparable in their levels of e-government development, with a growing number of countries trending upward. Among the 14 countries that moved to higher EGDI levels between 2020 and 2022, five are in Asia (Democratic People's Republic of Korea, Georgia, Lebanon, Nepal and Tajikistan) and three are in the Americas (Belize, Guyana and Peru).

Figures 2.4 and 2.5 show the regional distribution of countries by EGDI level over three consecutive Survey periods. Europe accounts for the highest proportion of countries in the very high EGDI group (58.3 per cent), followed by Asia (25 per cent), the Americas (13.3 per cent) and Oceania (3.3 per cent).

Figure 2.3   Regional snapshot of countries by EGDI level, 2022
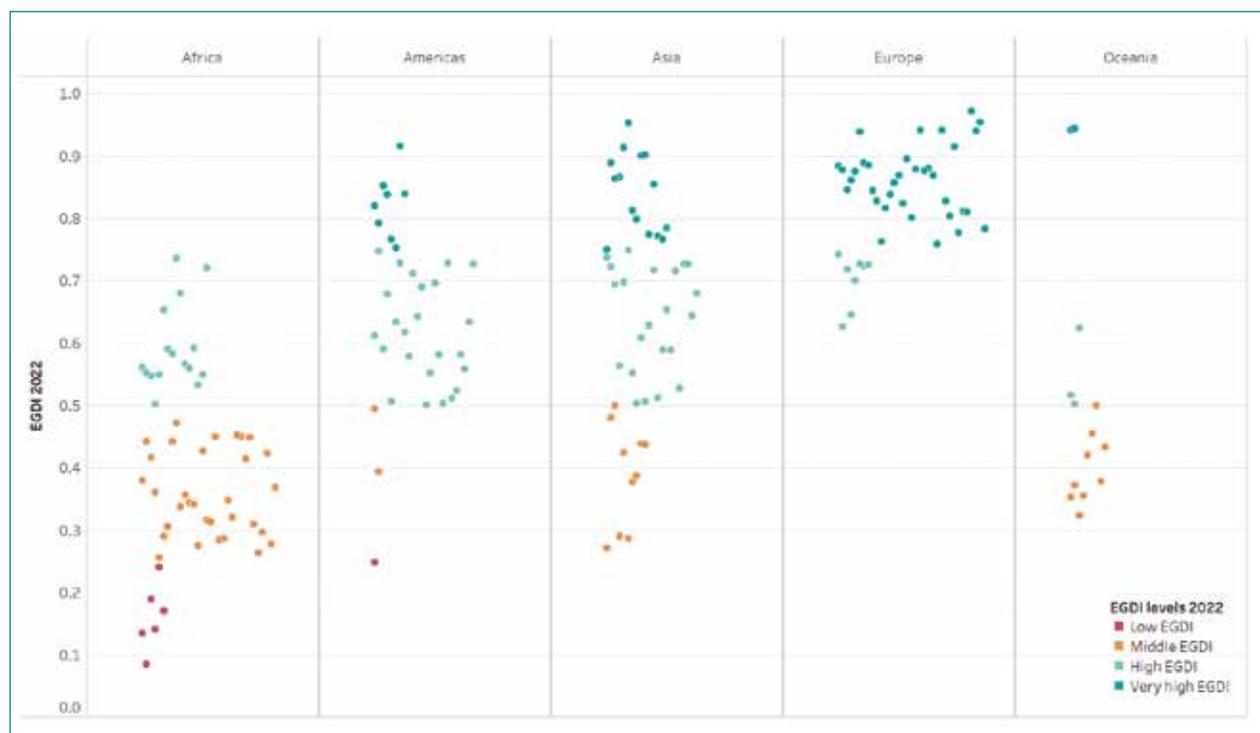
Source: 2022 United Nations E-Government Survey.

Figure 2.4   Number of countries in each EGDI group, by region, 2018, 2020 and 2022
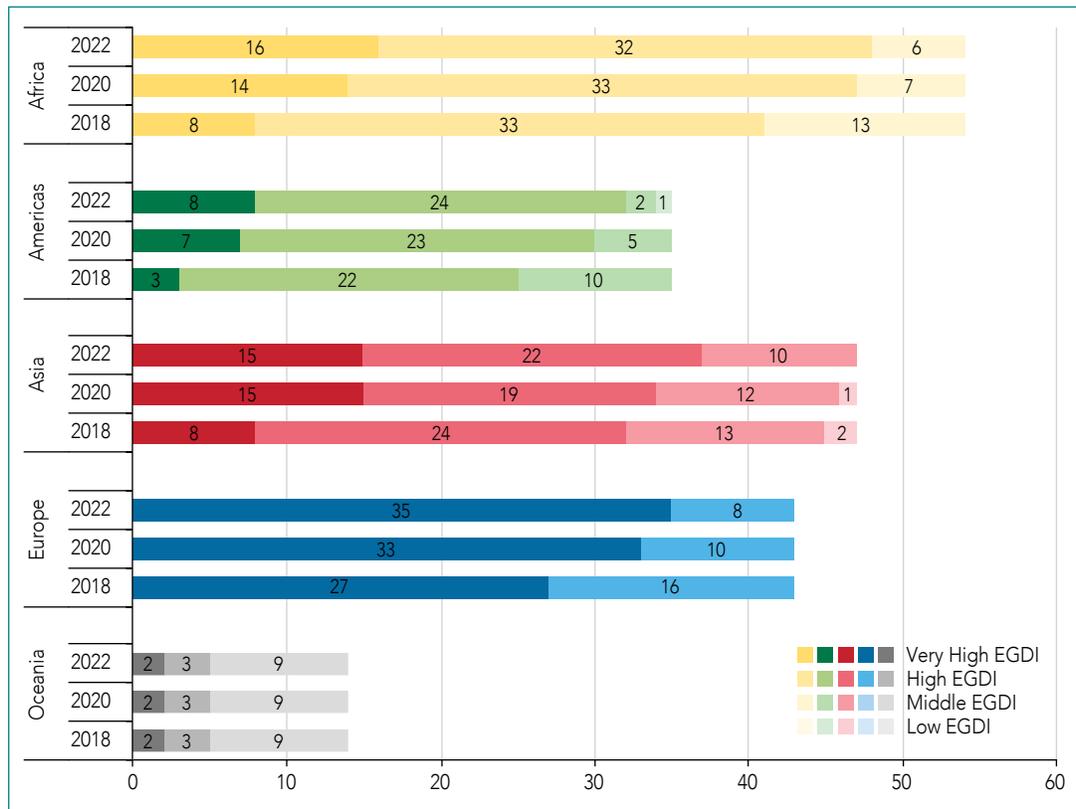
Sources: 2018, 2020 and 2022 United Nations E-Government Surveys.

Note: The graduated shading for each region signifies distinct EGDI levels, ranging from low EGDI (the lightest shade) to very high EGDI (the darkest shade).

Figure 2.5   Percentage of countries in each EGDI group, by region, 2018, 2020 and 2022
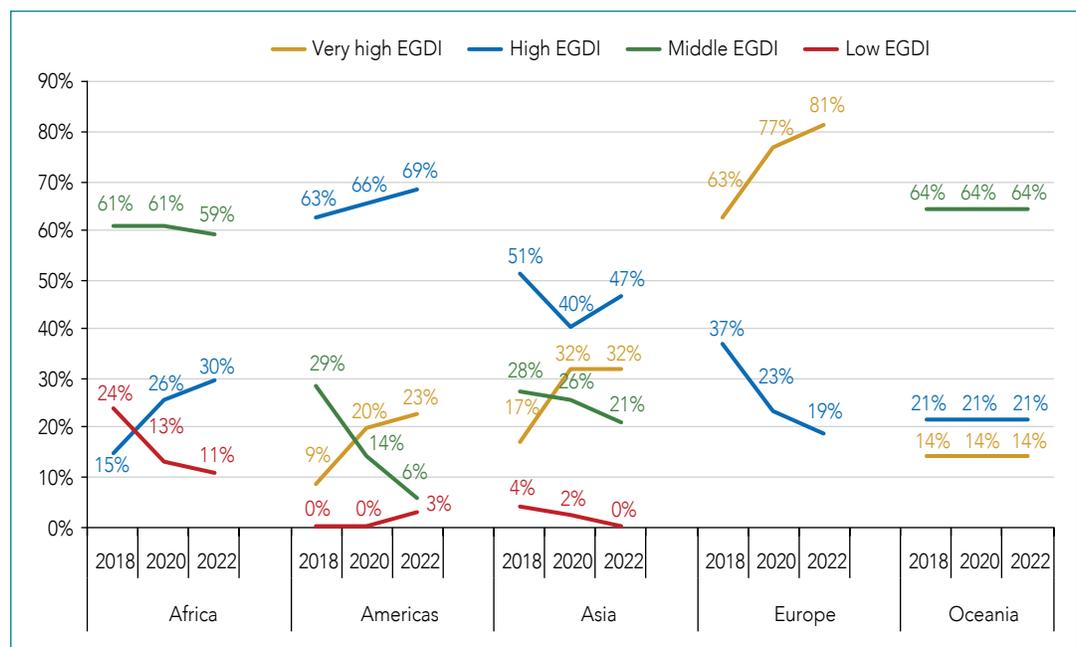
Sources: 2018, 2020 and 2022 United Nations E-Government Surveys.

In Europe, 81 per cent of the countries have very high EGDI values, and the remaining 19 per cent have high EGDI values. If the present trend continues, the small number of countries in the latter group will likely reach the highest level of e-government within a relatively short period of time.

In the Americas, 69 per cent of countries are in the high EGDI group, and 23 per cent are in the very high EGDI group. The proportion of countries in each group is increasing, signifying a steady improvement in e-government development in the region. As a result of this upward trend, the Americas region has seen the sharpest decline in the proportion of countries in the middle EGDI group; between 2018 and 2022, the share of countries in this group declined from 29 to 6 per cent.

In Asia, as in the Americas, the highest proportion of countries (47 per cent) are in the high EGDI group; however, the share of countries in the very high EGDI group is higher in Asia (32 per cent) than in the Americas (23 per cent). Both Asia and the Americas have experienced a significant (14-15 per cent) increase in the proportion of countries in the very high EGDI group since 2018.

In Oceania, 64 per cent of the 14 countries surveyed are in the middle EGDI group, 21 per cent are in the high EGDI group, and 14 per cent are in the very high EGDI group (see figure 2.5). Oceania is the only region that has seen no change in the distribution of countries by EGDI level over the past four years, though as mentioned before, the average EGDI level for the region has declined since 2020 as a result of the sharp downturn in TII performance.

In Africa, 59 per cent of the countries are in the middle EGDI group, and 30 per cent are in the high EGDI group. While there are no countries in Africa with very high EGDI values, the declining trend in the low and middle EGDI groups is encouraging.

2.2.1   Regional performance in online services provision

As explained in the previous chapter, the Online Services Index (OSI) component of the EGDI evaluates the provision of online services by Governments. The 2022 Survey assessed the availability of 22 types of online transactional services on government portals (see chapter 1, section 1.8). The results show that the total number of Member States offering at least one online service increased from 162 in 2020 to 177 in 2022, or by 9 per cent.

At the regional level, online services provision varies in both scope and prevalence. Figure 2.6 provides a visual snapshot of the number of countries in every region offering each of the 22 services assessed in the 2022 Survey.

Relatively speaking, Governments in all regions tend to do rather well in providing business-related services online. Registering a business and applying for a business licence are the two online services offered most frequently in every region. Among the least offered online services are submitting a change of address and registering a motor vehicle.

Europe offers the highest average number of services (19), followed by Asia (17), the Americas (16), Oceania (12) and Africa (12) (see figure 2.7). More than two thirds of the countries in Europe offer at least 19 services online, half of the countries offer all 22 services, and one third of the countries offer 14-18 services. Applying for a birth certificate and filing company/business taxes online are options offered in all of the region's countries. The online services offered least in Europe are applying for a visa (51 per cent) and registering a motor vehicle (60 per cent).

Nearly 80 per cent of the countries in Asia offer more than the world average of 16 online services, and 15 per cent offer all 22 of the services assessed in the Survey. However, around 15 per cent of the countries in Asia offer only 1-9 online services.

In the Americas, 63 per cent of the countries offer more than 16 services. The United States is the only country in the region that offers all 22 of the services assessed in 2022. Only 6 per cent of the countries in the region offer 1-9 services; Haiti offers the lowest number (2), while Cuba offers 7 services online.

Figure 2.6   Number of countries offering specified online services, by region, 2022

	Africa	Americas	Asia	Europe	Oceania
Register a business	45	32	44	42	14
Apply for business license	40	30	43	42	12
Apply for government vacancies online	36	29	42	41	12
Apply for birth certificate	33	31	38	43	11
File company/business tax online	34	30	39	43	7
Apply for death certificate	33	31	37	40	11
Submit income taxes	33	29	41	42	6
Apply for personal identity card	33	27	40	40	10
Pay for utilities (electricity/gas)*	32	31	41	37	8
Apply for marriage certificate	31	31	35	41	11
Apply for driver's license	30	28	38	40	10
Apply for building permit	31	31	37	38	8
Submit Value Added Tax	32	29	35	41	5
Apply for land title registration	27	27	37	39	9
Pay for utilities (water)*	33	26	38	35	4
Apply for environmental permit	22	26	36	39	10
Apply for social protection programmes	27	24	34	39	7
Pay fines	18	19	36	39	6
Apply for visa	23	13	35	22	4
Declare to police	12	19	24	34	3
Register a motor vehicle	10	12	28	26	1
Submit change of address	4	15	21	33	2

Source: 2022 United Nations E-Government Survey.

*In previous Surveys, utilities were assessed together. Since 2020, the E-Government Survey has collected disaggregated data on utility payments for (a) electricity/gas and (b) water to allow more accurate tracking of services provision in all countries.

Figure 2.7   Average number of services offered in each region, 2022

	Value
Africa	12
Americas	16
Asia	17
Europe	19
Oceania	12
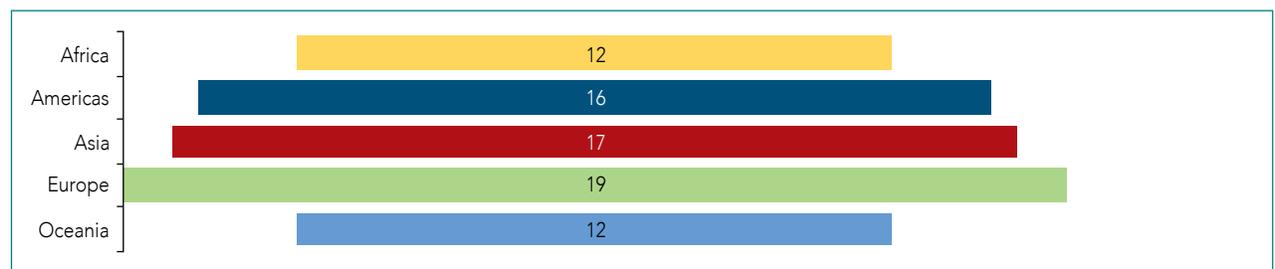
Source: 2022 United Nations E-Government Survey.

In Oceania, the average number of services offered online is 12. As figure 2.8 illustrates, however, 43 per cent of the countries in the region offer 5-9 services, a range well below the regional and global averages. All countries offering fewer than 12 services are SIDS with middle or low OSI levels. Registering a business online is the only service offered by all 14 countries in the region.

In Africa, 61 per cent of the countries offer an average of 12 services online. The 2022 Survey results indicate that, for the first time, five countries in Africa (Nigeria, Rwanda, Angola, Egypt and South Africa) are offering 20-21 online public services. This is noteworthy, given that only 63 of the Member States offer 20 or more of the 22 services assessed (25 countries in Europe, 22 in Asia, 9 in the Americas, 5 in Africa, and 2 in Oceania).

Figure 2.8   Number of online public services offered in different countries, by region, 2022

The x-axis displays the number of services, while the labels display the number of countries in the respective region offering the services. E.g.: there are 10 countries in both Asia and Europe that offer 21 online services.
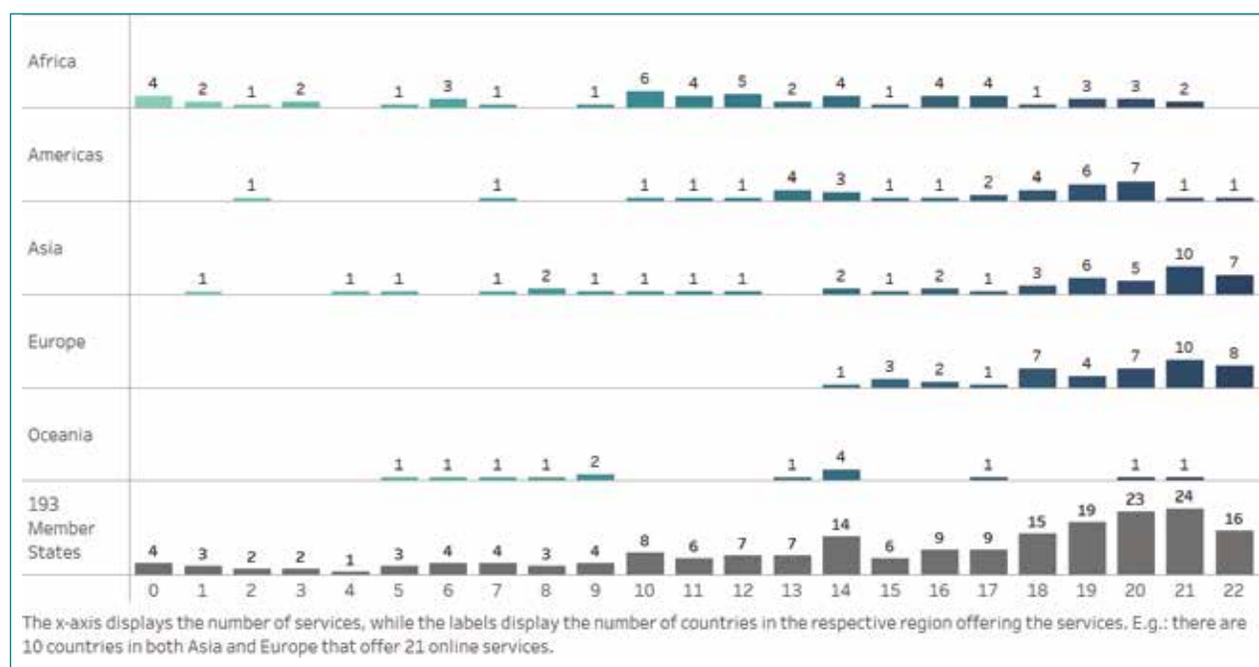
Source: 2022 United Nations E-Government Survey.

Note: The colour shades of the bars represent countries belonging to different EGDI groups (from low to very high); the lighter shades are for low and middle EGDI groups, and the darker shades are for high and very high EGDI groups.

2.2.2   Online services for people in vulnerable situations

In all regions, the number of countries offering online services for individuals in vulnerable situations—including people living in poverty, persons with disabilities, older people, immigrants, women and youth—has increased since 2020; Africa has registered the most notable increase (9 per cent), though Asia, Europe and Oceania have made solid gains as well, with increases ranging from 3 to 5 per cent (see figure 2.9). Europe has the largest proportion of countries offering services for vulnerable populations (96 per cent), followed by Asia (85 per cent), the Americas (83 per cent), Oceania (68 per cent) and Africa (64 per cent). It should be noted, however, that immigrants and people living in poverty appear to be less well served than other vulnerable populations in terms of e-government services provision.

Figure 2.9 shows the progress made since 2018 in online public services provision for people living in vulnerable situations, and figure 2.10 offers a graphic representation of the status of each region in 2022.

Figure 2.9   Number of countries offering online services for vulnerable groups, 2018, 2020 and 2022
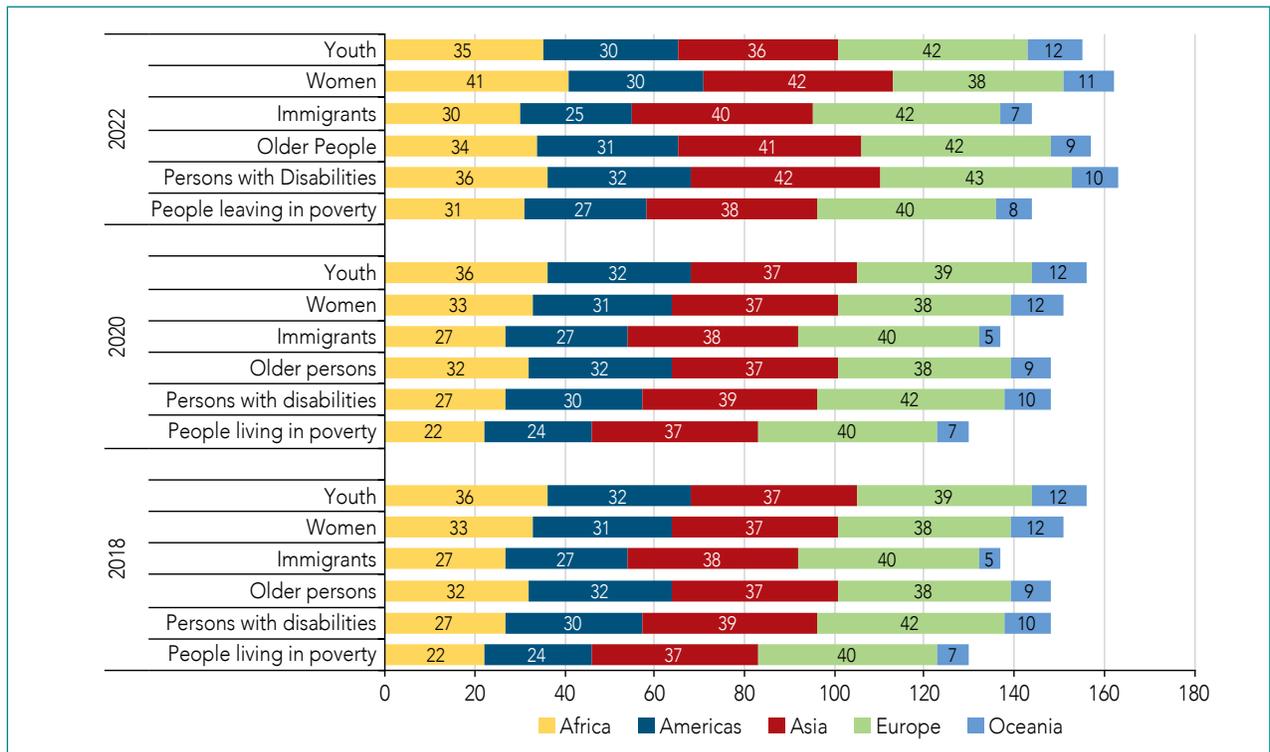
Sources: 2018, 2020 and 2022 United Nations E-Government Surveys.

Figure 2.10   Percentage of countries providing online services for vulnerable groups in each region, 2022
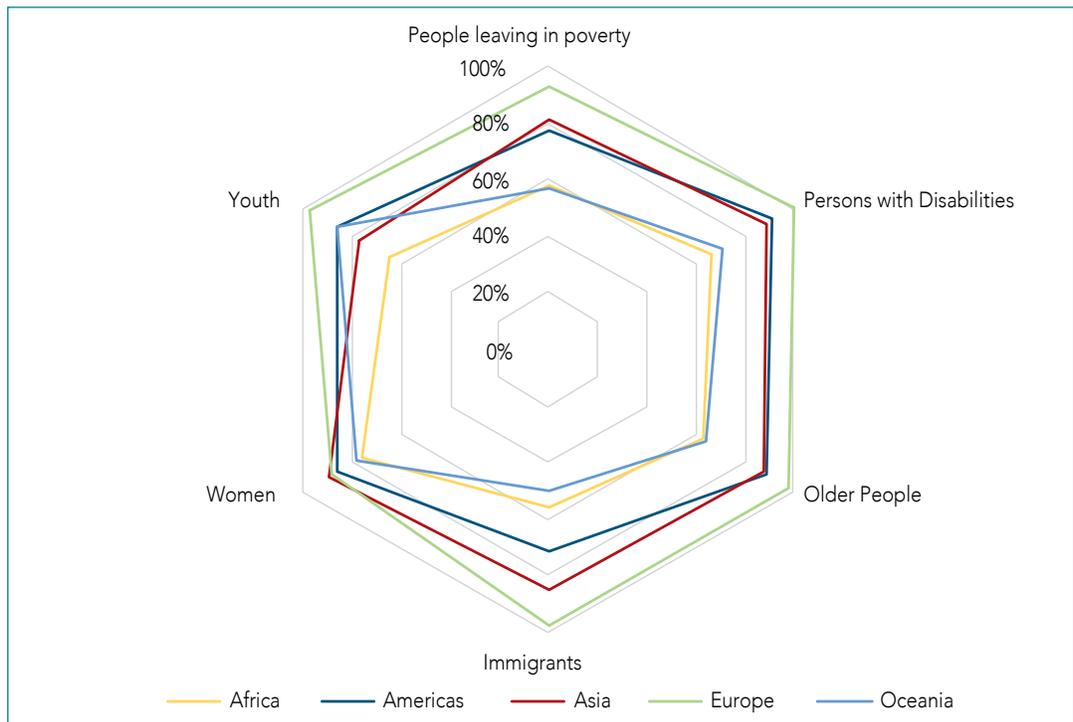
Sources: 2022 United Nations E-Government Survey.

2.2.3   COVID-19 measures

Since 2020, Governments in all regions have taken measures to address the COVID-19 pandemic, though the nature and extent of these efforts have varied widely. Between 91 and 98 per cent of the countries in Europe provide online information and platforms for distance learning and online information and scheduling for telehealth services, COVID-19 vaccines, and medical tests (see figures 2.11 and 2.12). In Africa, the Americas, Asia and Oceania, the majority of national Governments focus on services relating to distance learning and COVID-19 vaccinations, with fewer countries offering telehealth services and scheduling for medical tests. The proportion of countries offering all four types of services is highest in Europe (90 per cent), followed by Asia and the Americas (71 per cent each), Oceania (65 per cent) and Africa (40 per cent).

Figure 2.11   Number of countries offering online information and services in response to the COVID-19 pandemic, by region, 2022
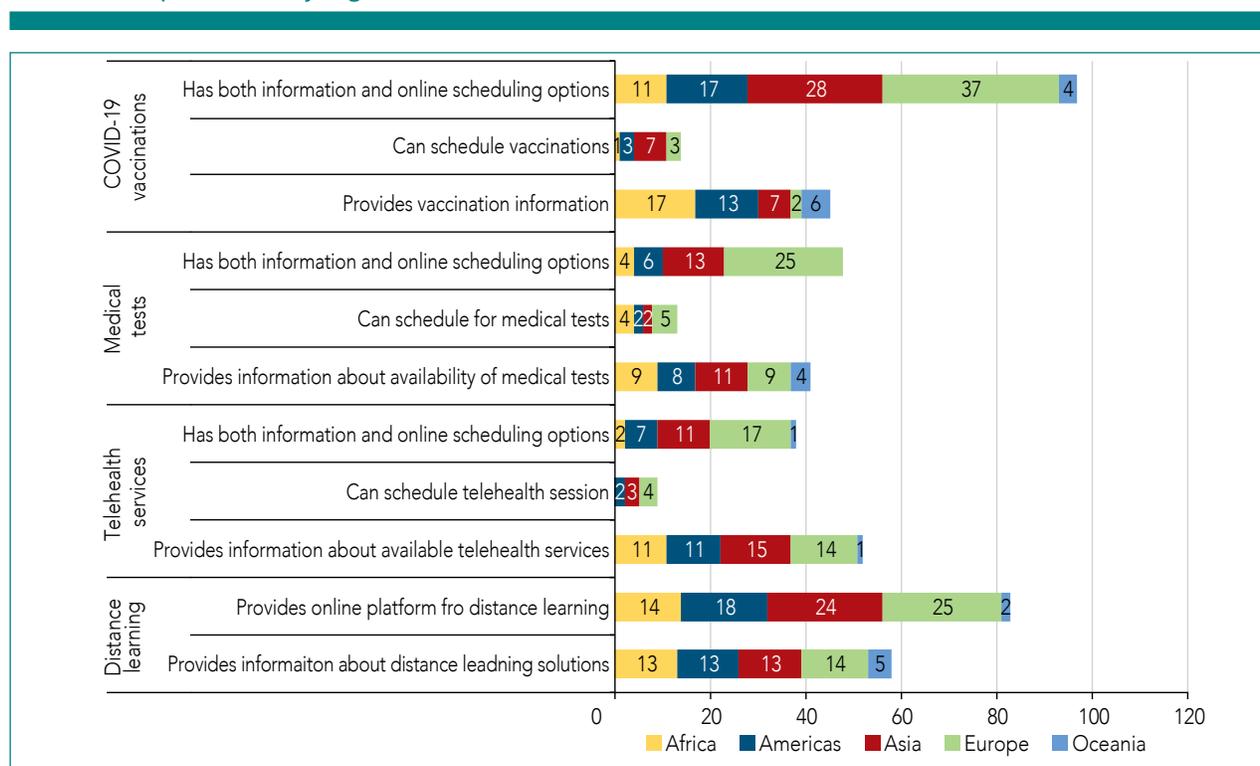
Source: 2022 United Nations E-Government Survey.

Figure 2.12   Percentage of countries offering online information and services in response to the COVID-19 pandemic, by region, 2022
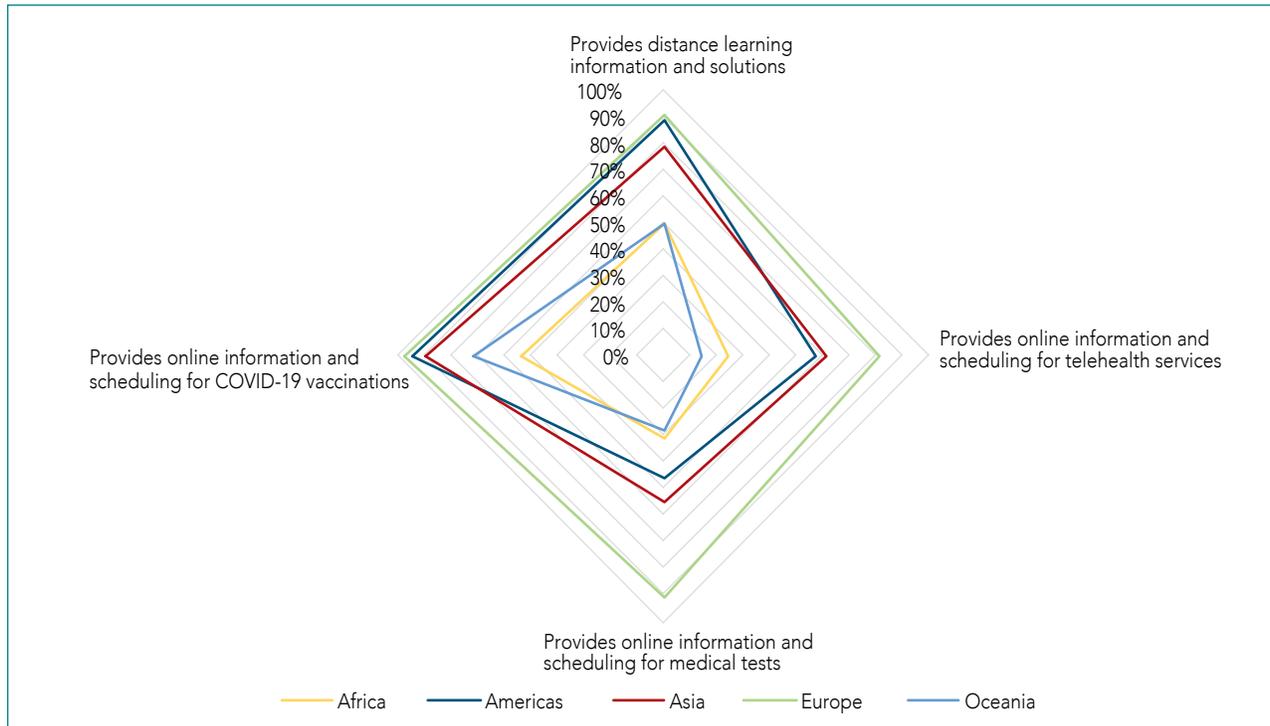
Source: 2022 United Nations E-Government Survey.

2.2.4   Africa: country grouping analysis

Table 2.1 displays the key Survey results for the 16 countries in Africa with the highest EGDI values in 2022. These countries are in the high EGDI group and, in descending order, are further divided into HV, H3, H2 and H1 rating classes. Consistent with the previous two Surveys, only four countries (Mauritius, Seychelles, South Africa and Tunisia) are among the top 100 countries in terms of overall EGDI ranking, with values above the global average of 0.6102.

South Africa has become the regional front-runner in e-government development, with an EGDI value of 0.7357 and a place in the highest (HV) rating class; Mauritius, also in the HV rating class, is next, followed by Seychelles and Tunisia (both H3). Mauritius has the highest TII value in Africa (0.7588) and a very high HCI value (0.7733), suggesting that the country is well positioned to strengthen its overall e-government development if it can improve its online services provision. Although the EGDI values for Rwanda, Côte d'Ivoire and Zambia remain below the global average of 0.6102, these three countries moved from the middle to the high EGDI group for the first time in 2022. Among the 16 countries in the high EGDI group in Africa, 14 are upper-middle-income or lower-middle-income countries; only Seychelles is a high-income country, and Rwanda is the lone low-income country. Rwanda is the only country in Africa that has a very high OSI value (0.7935), though its level of human capital development is modest (as reflected in an HCI value of 0.5322), and the country has a poorly developed telecommunications infrastructure (as reflected in a TII value of 0.3209). This indicates that Rwanda is directing significant investment towards online services development, allowing it to compete with the world's leading countries in this area.

Table 2.1   Countries in Africa with the highest EGDI values

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
South Africa	HV	65	Southern Africa	0.7487	0.7733	0.6850	0.7357	0.6891
Mauritius	HV	75	Eastern Africa	0.6282	0.7733	0.7588	0.7201	0.7196
Seychelles	H3	85	Eastern Africa	0.4424	0.7758	0.8198	0.6793	0.6920
Tunisia	H3	88	Northern Africa	0.6031	0.6911	0.6646	0.6530	0.6526
Morocco	H2	101	Northern Africa	0.4721	0.6350	0.6676	0.5915	0.5729
Egypt	H2	103	Northern Africa	0.5730	0.6375	0.5579	0.5895	0.5527
Ghana	H2	106	Western Africa	0.5361	0.6176	0.5934	0.5824	0.5960
Cabo Verde	H2	110	Western Africa	0.4965	0.6507	0.5507	0.5660	0.5604
Algeria	H2	112	Northern Africa	0.3743	0.6956	0.6133	0.5611	0.5173
Kenya	H2	113	Eastern Africa	0.6821	0.5641	0.4305	0.5589	0.5326
Gabon	H2	116	Middle Africa	0.3578	0.6706	0.6279	0.5521	0.5401
Botswana	H1	118	Southern Africa	0.2740	0.6932	0.6814	0.5495	0.5383
Rwanda*	H1	119	Eastern Africa	0.7935	0.5322	0.3209	0.5489	0.4789
Côte d'Ivoire*	H1	120	Western Africa	0.5467	0.5748	0.5186	0.5467	0.4457
Namibia	H1	121	Southern Africa	0.4316	0.6516	0.5133	0.5322	0.5747
Zambia*	H1	131	Eastern Africa	0.4414	0.6744	0.3909	0.5022	0.4242

Sources: 2020 and 2022 United Nations E-Government Surveys.

Note: Countries in italics are LDCs, LLDCs or SIDS.

* Countries that moved from the middle to the high EGDI group in 2022.

Digitalization trends in Africa are positive overall. Fixed (wired) broadband subscriptions have jumped 48 per cent since 2020, rising from 1.80 to 2.67 per 100 inhabitants. Survey results for 2022 indicate that 33 per cent of the region's residents use the Internet, 42.8 per cent are active mobile broadband subscribers, and 83.7 per cent have mobile cellular telephone subscriptions (see chapter 1 for more details). Nevertheless, the values for these indicators remain below the corresponding global averages, and the cost of mobile broadband subscriptions as a percentage of gross national income per capita remains significantly higher in Africa than in other parts of the world, contributing to the digital divide.

Africa faces persistent challenges linked to inadequate investment in e-government development. Low-income and lower-middle-income countries make up 85 per cent of the regional total, and two thirds of these countries are LDCs, LLDCs and/or SIDS. Africa is home to 39 of the 91 countries in special situations worldwide. The lowest EGDI and subindex values are found among the LDCs, including those that are also LLDCs and SIDS (see figure 2.13); the average EGDI value for this group is 0.3233. Among the LLDCs, Botswana has the highest TII value (0.6814) but the lowest OSI value (0.2740). The SIDS in Africa have an average EGDI value of 0.3872; Mauritius has the highest OSI value, and Seychelles has the top TII value.

As noted previously, the regional average EGDI value for Africa is 0.4054, which is well below the global average of 0.6102. Almost two thirds of the countries in Africa (59 per cent) have middle EGDI values, and close to a third (30 per cent) have high EGDI values. While there are no countries in Africa in the very high EGDI group, the declining trend in African representation in low and middle EGDI groups is encouraging.

Figure 2.13   Countries in special situations in Africa, 2022
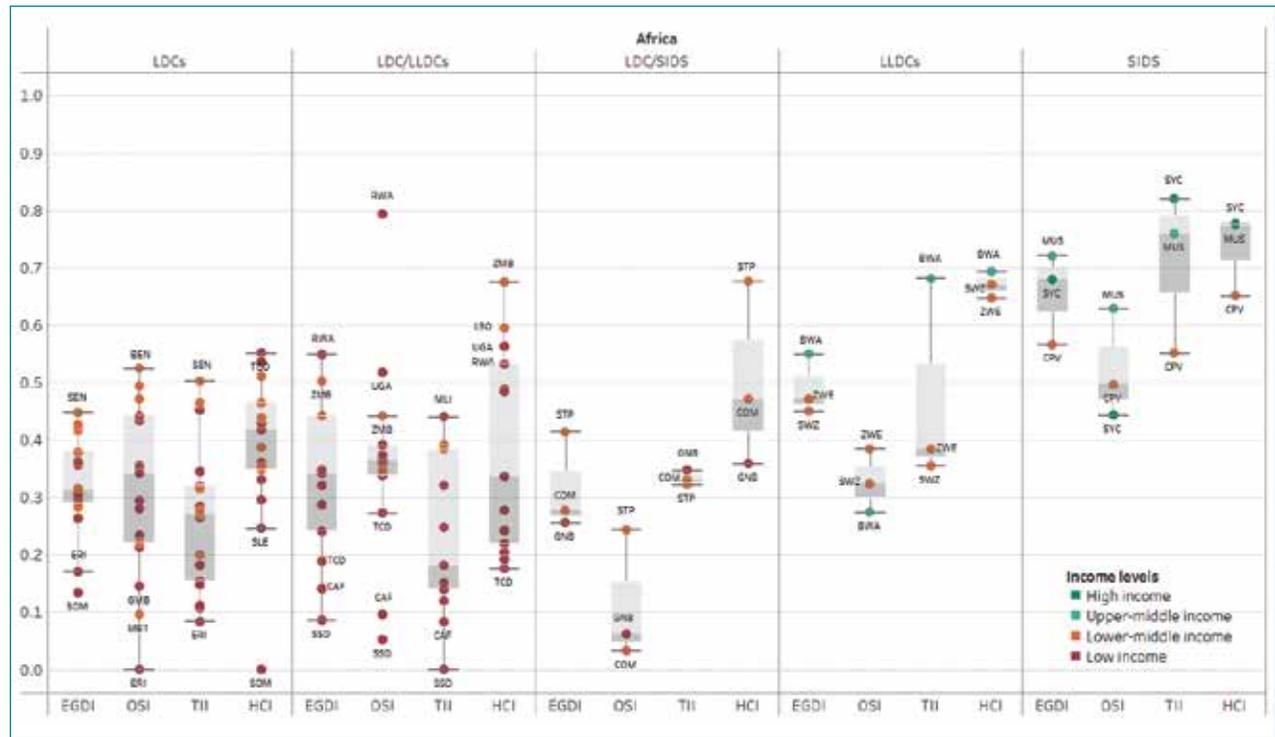
Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

Box 2.1   Mauritius, Rwanda, Seychelles and South Africa

South Africa, Mauritius and Seychelles are respectively ranked first through third in the African region in e-government development, and Rwanda has seen significant improvement in its ranking, moving up by more than 10 positions. Though characterized by important differences, these countries have in common rapid progress in e-government development deriving from long-term digital government strategies aligned with national policies and the SDGs.

In **South Africa**, the National Development Plan: Vision for 2030 includes the National E-Government Strategy and Roadmap, which aims at digitalizing government services and creating an inclusive digital society in alignment with SDG 16. Around 150 government services have been consolidated under the national e-government portal to simplify and streamline the flow of information and ensure easy access for users. By increasing the efficacy and cost-effectiveness of the governance structure, the country hopes to be able to promote sustainable economic growth and foster inclusive innovation in accordance with SDGs 8 and 9.

In **Mauritius**, the Digital Government Transformation Strategy contains specific recommendations for government agencies on how to activate the SDGs. The strategy proposes a list of best implementation practices for every Goal and encourages cross-sectoral collaboration between public and private entities to holistically address intersectoral issues. The Ministry of Information Technology, Communication and Innovation has worked together with the business community to align the Digital Government Transformation Strategy with the Public Sector Business Transformation Strategy. To deal with the organizational challenges of a nationwide process and guarantee successful implementation, an oversight and reporting mechanism called the High Level Digital Government Task Force has been created. This group is chaired by the Prime Minister, who also supervises ministerial committees on digital transformation.

Box 2.1 *(continued)*

In **Seychelles**, significant digital transformation has taken place since the beginning of the COVID-19 pandemic. As highlighted by the Vice President of the Republic of Seychelles, the country has used the digitalization momentum created by the pandemic to introduce innovative changes in the education and public administration systems, taking the country one step closer to realizing the Goals set out in the 2030 Agenda. Digital transformation in the country has not reached its full potential, largely due to the slow speed and high cost of Internet services; however, the Government has been working with telecommunications services to extend Internet accessibility to more segments of the population.

The success enjoyed by **Rwanda** in e-government development derives from a long-term vision that was initiated in 2000 and realized in 2020 with the SMART Rwanda Master Plan. The strategy and its focus on digital transformation are intended to contribute to the attainment of the SDGs, in particular Goal 9. Besides significantly increasing access to ICT and striving to provide universal and affordable access to the Internet, the Government has expanded investment to facilitate sustainable infrastructure development and support domestic technology development. By 2024, the Government is committed to making its services available online 24 hours a day and making all citizens and residents digitally literate regardless of their socio-economic or political status.

Sources: 2022 Member States Questionnaires; South Africa, Department of Telecommunications and Postal Services, Notice 886 of 2017, "National e-Government Strategy and Roadmap", *Government Gazette*, 10 November 2017, available at https://www.gov.za/sites/default/files/gcis_document/201711/41241gen886.pdf; Mauritius, Ministry of Technology, Communication and Innovation, Central Informatics Bureau, *Digital Government Transformation Strategy*, 2018-2022, available at https://cib.govmu.org/Documents/Reports/Digital%20Government%20Strategy%202018-2022.pdf; Seychelles, "Accelerating digital transformation in challenging times", message from the Vice President of the Republic of Seychelles on World Telecommunication and Information Society Day, 17th May 2021, available at https://www.ict.gov.sc/documents/2021/WTISD_2021_VP_message.pdf; Rwanda, Ministry of Information Technology and Communications, *ICT Sector Strategic Plan (2018-2024): "Towards digital enabled economy"*, November 2017, available at https://risa.rw/fileadmin/user_upload/Others%20documents/ICT%20SECTOR%20STRATEGIC%20PLAN%202018-2024.pdf.

2.2.5   The Americas: country grouping analysis

The countries with the highest EGDI values in the Americas are listed in table 2.2. Eight of these countries are in the very high EGDI group; the United States (the only member of the VH rating class) is ranked highest, followed by Canada, Uruguay, Chile and Argentina (all V2), then Brazil, Costa Rica and Peru (all V1). In 2022, Peru transitioned from the high to the very high EGDI group for the first time.

The other four countries highlighted in table 2.2 (Mexico, Granada, Bahamas and Colombia) are in the highest (HV) rating class of the high EGDI group and are well positioned for accelerated e-government development, though they may need to modify their policy approaches and strategic investments to achieve sufficient momentum. Mexico and Colombia already have very high OSI and TII values, but their low HCI values point to the need for increased investment in human capital development. Granada has very high HCI and TII values but a relatively low OSI value, indicating that greater attention should be given to strengthening online services provision; a similar situation prevails in the Bahamas, though this country's OSI value is higher than that of Granada.

Table 2.2   Countries in the Americas with the highest EGDI values

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
United States of America	VH	10	Northern America	0.9304	0.9276	0.8874	0.9151	0.9297
Canada	V2	32	Northern America	0.8504	0.9260	0.7770	0.8511	0.8420
Uruguay	V2	35	South America	0.7641	0.8980	0.8543	0.8388	0.8500
Chile	V2	36	South America	0.8280	0.8853	0.7999	0.8377	0.8259
Argentina	V2	41	South America	0.8089	0.9173	0.7332	0.8198	0.8279
Brazil	V1	49	South America	0.8964	0.7953	0.6814	0.7910	0.7677
Costa Rica	V1	56	Central America	0.6812	0.8593	0.7572	0.7659	0.7576
Peru*	V1	59	South America	0.8099	0.8207	0.6267	0.7524	0.7083
Mexico	HV	62	Central America	0.8245	0.7874	0.6300	0.7473	0.7291
Grenada	HV	66	Caribbean	0.5507	0.8977	0.7348	0.7277	0.5812
Bahamas	HV	66	Caribbean	0.6214	0.7641	0.7976	0.7277	0.7017
Colombia	HV	70	South America	0.7418	0.7867	0.6498	0.7261	0.7164

Sources: 2020 and 2022 United Nations E-Government Surveys.

* Countries that moved from the high to the very high EGDI group in 2022.

Progress in e-government development remains steady in the Americas region. The proportion of countries in the high and very high EGDI groups has increased by 3 per cent since 2020, rising from 66 to 69 per cent and from 20 to 23 per cent, respectively. As a consequence of this upward trend, the share of countries in the middle EGDI group has declined from 14 to 6 per cent over the past two years.

The vast majority of countries in the Americas region (89 per cent) have remained in the same EGDI groups since 2020. Peru, Guyana and Belize moved from the middle to the high EGDI group in 2022; Haiti is the only country that experienced a downturn, shifting from the middle to the low EGDI group.

Nine out of ten countries in the Americas region are in the high or very high EGDI group—an increase of about 5 per cent since the 2020 Survey. The average EGDI value in the Americas has also increased over the past two years, rising from 0.6341 to 0.6438.

Although Grenada has remained in the high EGDI group, it has made the most notable progress in e-government development in the region, increasing its EGDI value from 0.5812 in 2020 to 0.7277 in 2022; this is largely due to significant improvements in online services provision (reflected in an increase in the OSI value from 0.3421 to 0.5507) and efforts to strengthen the telecommunications infrastructure (reflected in a TII value increase from 0.5738 to 0.7770).

Haiti, ranked 187th, is the only country in the Americas with a low EGDI value (0.2481); its very low OSI value (0.0865) and moderately low TII value (0.2646) reflect the country's ongoing struggle to deal with a chronic lack of resources and the damage to its telecommunications infrastructure caused by natural disasters.

Among the 35 countries in the Americas region, 18 are in special situations, and all but two of the latter are SIDS. The average EGDI value for SIDS in the Americas is 0.6450—higher than the global EGDI average and the average EGDI values for SIDS in Africa (0.4555) and Oceania (0.4301). This can be explained in part by the fact that SIDS in the Americas are mostly upper-middle-income and high-income countries that have more resources to invest in telecommunications infrastructure and human capital development. As figure 2.14 suggests, however, the potential exists in this group of countries for improved online services development.

Box 2.2   Peru, Guyana and Belize

The vast majority of countries in the Americas have remained in the same EGDI groups since 2020. Peru, Guyana and Belize, however, have made notable progress in e-government development, due in part to their willingness to collaborate with partners at many levels to accelerate the process of digital transformation.

In **Peru**, innovations in e-government have been the product of multiple internal and external collaborations. At the international level, the country joined the Building the Europe Links with Latin America (BELLA) project to establish ultra-high-speed cable connectivity and link 11 European and Latin American research and education networks. At the regional level, the country partnered with Colombia, Mexico and Paraguay to create the Better Than Cash Alliance and facilitate the transition from cash to digital payment systems to reduce poverty and drive inclusive growth. At the national level, various public agencies collaborated to launch the National Policy on Digital Transformation, which included the establishment of a National Digital Talent Platform that provided training for 60,000 residents nationwide in the areas of governance and digital transformation.

In **Guyana**, the Government has committed to becoming digitally driven by 2030 with the help of global organizations. At the beginning of 2022, the country organized a series of events with ministries, United Nations representatives and digital innovation specialists to reflect on how best to implement e-government transformation to achieve the SDGs. The country has also partnered with NRD Companies, a leading enterprise in digitalization projects. As some parts of the country still lack access to the Internet, the Government has launched the ICT Access and E-Services for Hinterland, Poor and Remote Communities initiative to tackle the digital gap in Guyana. Besides expanding Internet connectivity, NRD will contribute to improving the information management system and to the digitalization of the Division of Social Protection and Health of Guyana to ensure the social security of rural communities.

Belize is currently updating its E-Governance Strategy and Action Plan; however, many public institutions have already benefited from various multilateral cooperation initiatives. Working together with APEX, the Caribbean Agency for Justice Solutions, the Government is moving forward with the digitalization of the Court of Appeals. The project has introduced electronic filing and case management systems to help officers monitor, analyse and report on case trends and to increase the transparency and accountability of the judicial system. Through collaboration with the Government of China, the E-Governance and Digitalization Unit has improved the management of the entire transport sector using information technology. The project has integrated the Belize Police Department, Customs and Excise Department and Magistrates Court into the same system as the Department of Transport, facilitating the sharing of data and investigations relating to accidents and violations.

Sources: 2022 Member States Questionnaires for Peru, Guyana and Belize; Organization for Economic Cooperation and Development, review of Peru in *Latin American Economic Outlook 2020: Digital Transformation for Building Back Better*, section on national strategies and international cooperation for digital transformation, available at https://www.oecd-ilibrary.org/sites/4f73e4bf-en/index.html?itemId=/content/component/4f73e4bf-en; Peru, Presidencia del Consejo de Ministros, Laboratorio de Gobierno y Transformación Digital [Governance and Digital Transformation Laboratory] (2022), available at https://www.gob.pe/laboratoriodigital; NRD Companies, "Guyana undergoing major digital transformation to provide online government services to citizens scattered around the country", press release, 18 January 2022, available at https://www.nrd.no/en/press-releases/guyana-undergoing-major-digital-transformation-to-provide-online-government-services-to-citizens-scattered-around-the-country/150; Belize, Press Office, "E-Governance and Digitalization Unit supports Belize motor vehicle registration and licensing system", press release, 23 June 2021, available at https://www.pressoffice.gov.bz/e-governance-and-digitalization-unit-supports-belize-motor-vehicle-registration-and-licensing-system/; Belize, "Belize Government moves to digital transformation of judiciary", Belize.com, 25 February 2021, available at https://belize.com/news/belize-government-moves-to-digital-transformation-of-judiciary/.

Figure 2.14   Countries in special situations in the Americas, 2022

Notes: CCountries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

2.2.6   Asia: country grouping analysis

The top 22 countries in Asia are in the very high EGDI group (see table 2.3). As reported in chapter 1, the Republic of Korea, Singapore, the United Arab Emirates and Japan are in the highest (VH) rating class and are among the global leaders in e-government development. The United Arab Emirates has joined the VH rating class of the very high EGDI group for the first time in 2022.

Asia increased its average EGDI value from 0.6373 in 2020 to 0.6493 in 2022, remaining the second most advanced region in e-government development. The levels of e-government development among individual countries in the region remain highly diverse, with wide variance in EGDI values and rankings. The Republic of Korea (3rd), Singapore (12th), the United Arab Emirates (13th) and Japan (14th) are global leaders in e-government development, while Yemen (178th), Afghanistan (184th) and the Democratic People's Republic of Korea (180th) are among the countries with the lowest EGDI rankings—though it should be noted that none of the Asian countries are in the low EGDI group. More than half of the countries in Asia have improved their EGDI rankings in 2022; five countries (Democratic People's Republic of Korea, Georgia, Lebanon, Nepal and Tajikistan) have moved up to the next EGDI level.

Asia has the second largest number of countries in special situations after Africa (20 versus 39), though the average EGDI value for these countries is higher in Asia (0.5851) than in Africa (0.3588). As shown in figure 2.15, the LDCs in Asia, including those that are also LLDCs and SIDS, have lower EGDI values than do the LLDCs and SIDS—similar to the findings for Africa. The three SIDS in Asia with high or very high EGDI values are Maldives (0.5885), Bahrain (0.7707) and Singapore (0.9133).

Table 2.3   Countries in Asia with the highest EGDI values

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
Republic of Korea	VH	3	Eastern Asia	0.9826	0.9087	0.9674	0.9529	0.9560
Singapore	VH	12	South-Eastern Asia	0.9620	0.9021	0.8758	0.9133	0.915
United Arab Emirates	VH	13	Western Asia	0.9014	0.8711	0.9306	0.9010	0.8555
Japan	VH	14	Eastern Asia	0.9094	0.8765	0.9147	0.9002	0.8989
Israel	V3	16	Western Asia	0.8745	0.8994	0.8915	0.8885	0.8361
Cyprus	V3	27	Western Asia	0.7792	0.8934	0.9253	0.8660	0.8731
Kazakhstan	V3	28	Central Asia	0.9344	0.9021	0.7520	0.8628	0.8375
Saudi Arabia	V2	31	Western Asia	0.8220	0.8662	0.8735	0.8539	0.7991
China	V2	43	Eastern Asia	0.8876	0.7429	0.8050	0.8119	0.7948
Turkey	V1	48	Western Asia	0.8600	0.8722	0.6626	0.7983	0.7718
Oman	V1	50	Western Asia	0.7423	0.8067	0.8012	0.7834	0.7749
Malaysia	V1	53	South-Eastern Asia	0.7630	0.7645	0.7945	0.7740	0.7892
Bahrain	V1	54	Western Asia	0.7523	0.8154	0.7444	0.7707	0.8213
Thailand	V1	55	South-Eastern Asia	0.7763	0.7879	0.7338	0.7660	0.7565
Georgia*	V1	60	Western Asia	0.6111	0.8984	0.7409	0.7501	0.7174
Kuwait**	HV	61	Western Asia	0.6973	0.7706	0.7774	0.7484	0.7913
Armenia	HV	64	Western Asia	0.7221	0.7945	0.6925	0.7364	0.7136
Brunei Darussalam	HV	68	South-Eastern Asia	0.5871	0.7567	0.8372	0.7270	0.7389
Uzbekistan	HV	69	Central Asia	0.7440	0.7778	0.6575	0.7265	0.6665
Mongolia	HV	74	Eastern Asia	0.6263	0.8391	0.6973	0.7209	0.6497
Indonesia	HV	77	South-Eastern Asia	0.7644	0.7438	0.6397	0.7160	0.6612
Qatar	HV	78	Western Asia	0.6094	0.7150	0.8203	0.7149	0.7173

Sources: 2020 and 2022 United Nations E-Government Surveys.

* Countries that moved from the high to the very high EGDI group in 2022.
** Countries that moved from the very high to the high EGDI group in 2022.

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.

Four of the six GCC countries are in the very high EGDI group; the United Arab Emirates is ranked highest and is part of the VH rating class, followed by Saudi Arabia (V2) and Bahrain and Oman (both V1). Kuwait and Qatar are in the highest (HV) rating class of the high EGDI group. All of these countries have highly developed telecommunications infrastructure (the average TII for this group is 0.8246). Most also have relatively high OSI and HCI values, though strengthening investment in online services provision could help propel Qatar and Kuwait into the very high EGDI group. Qatar should also consider investing more in human capital development, and Bahrain would likely benefit from further investment in infrastructure.

Box 2.3   United Arab Emirates and Kazakhstan

The United Arab Emirates has joined the very high rating class of the very high EGDI group for the first time and is among the global leaders in e-government development. The country is ranked fourth worldwide in investment in telecommunications services and in the digital adaptation of its legal framework. The Government defines itself as the world's first 100 per cent paperless Government—a feat achieved through the full digitalization of the education, health, community development, economy and security sectors. Among other initiatives, 525 of the country's 589 schools have participated in a self-evaluation process that will lead to their eventual conversion to smart schools. Public administration has also undergone digitalization and simplification processes. At present, the Government provides 500 online services, many of which have been streamlined and made faster and easier for public institutions and users. For example, the processing time for family registration has been reduced from three days to a few minutes, and the Government has calculated that the digitalization of business registration has saved 10 million hours of waiting time for applicants and 45,600 hours for employees.

Kazakhstan has the highest EGDI value among the LLDCs, and the Government is planning to expand and accelerate the digital transformation process under its Digital Kazakhstan programme. Over the past several years, there have been significant improvements in the ICT infrastructure. In 2018, only 100,000 people living in around 55 rural settlements had access to the Internet via fibre optic cable; by 2020, the Government had extended fibre optic lines to 741 settlements, and the number of those served had jumped to 800,000. The transport and logistics sectors have undergone a digitalization process that has led to the introduction of a smart traffic system and the implementation of a highway assets control programme using digital technologies.

Sources: Member States Questionnaires for the United Arab Emirates and Kazakhstan.

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	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
United Arab Emirates	VH	13	Western Asia	0.9014	0.8711	0.9306	0.9010	0.8555
Saudi Arabia	V2	31	Western Asia	0.8220	0.8662	0.8735	0.8539	0.7991
Oman	V1	50	Western Asia	0.7423	0.8067	0.8012	0.7834	0.7749
Bahrain	V1	54	Western Asia	0.7523	0.8154	0.7444	0.7707	0.8213
Kuwait*	HV	61	Western Asia	0.6973	0.7706	0.7774	0.7484	0.7913
Qatar	HV	78	Western Asia	0.6094	0.7150	0.8203	0.7149	0.7173

Sources: 2020 and 2022 United Nations E-Government Surveys.

* Countries that moved from the very high to the high EGDI group in 2022.

Figure 2.15   Countries in special situations in Asia, 2022

Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

2.2.7   Europe: country grouping analysis

Europe has the highest average EGDI value (0.8602), as well as the highest average HCI and TII values (0.9030 and 0.8648, respectively). It has topped the global charts since the inception of the E-Government Survey and has the most homogeneous e-government development (see figure 2.2). Of the 43 European countries surveyed, 35 are in the very high EGDI group (see table 2.5); eight of the latter (Denmark, Estonia, Finland, Sweden, United Kingdom, Netherlands, Iceland and Malta) are in the highest (VH) rating class and are among the global leaders in e-government development. In 2022, Serbia and Ukraine moved from the high to the very high EGDI group for the first time.[2]

Eight countries in Europe are in the high EGDI group and have an average EGDI value of 0.7005. In terms of subregional distribution, Albania, Andorra, Bosnia and Herzegovina, Montenegro, North Macedonia and San Marino are in Southern Europe, Monaco is in Western Europe, and the Republic of Moldova is in Eastern Europe.

As shown in figure 2.16, the two LLDCs in Europe have relatively less developed infrastructure, with TII values of 0.5760 for the Republic of Moldova and 0.6417 for North Macedonia. All European countries except Ukraine are in the high-income or upper-middle-income group.

Table 2.5   Countries in Europe with the highest EGDI values

Country	Rating class	EGDI rank	Subregion	EU	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
Denmark	VH	1	Northern Europe	Yes	0.9797	0.9559	0.9795	0.9717	0.9758
Finland	VH	2	Northern Europe	Yes	0.9833	0.9640	0.9127	0.9533	0.9452
Sweden	VH	5	Northern Europe	Yes	0.9002	0.9649	0.9580	0.9410	0.9365
Iceland	VH	5	Northern Europe	No	0.8867	0.9657	0.9705	0.9410	0.9101
Estonia	VH	8	Northern Europe	Yes	1.0000	0.9231	0.8949	0.9393	0.9473
Netherlands	VH	9	Western Europe	Yes	0.9026	0.9506	0.9620	0.9384	0.9228
United Kingdom of Great Britain and Northern Ireland	VH	11	Northern Europe	No	0.8859	0.9369	0.9186	0.9138	0.9358
Malta	VH	15	Southern Europe	Yes	0.8849	0.8734	0.9245	0.8943	0.8547
Norway	V3	17	Northern Europe	No	0.8007	0.9528	0.9102	0.8879	0.9064
Spain	V3	18	Southern Europe	Yes	0.8559	0.9072	0.8895	0.8842	0.8801
France	V3	19	Western Europe	Yes	0.8768	0.8784	0.8944	0.8832	0.8718
Austria	V3	20	Western Europe	Yes	0.8827	0.9070	0.8505	0.8801	0.8914
Slovenia	V3	21	Southern Europe	Yes	0.8666	0.9439	0.8239	0.8781	0.8546
Germany	V3	22	Western Europe	Yes	0.7905	0.9446	0.8957	0.8770	0.8524
Switzerland	V3	23	Western Europe	No	0.7677	0.9128	0.9450	0.8752	0.8907
Lithuania	V3	24	Northern Europe	Yes	0.8347	0.9251	0.8636	0.8745	0.8665
Liechtenstein	V3	25	Western Europe	No	0.7329	0.8726	1.0000	0.8685	0.8359
Luxembourg	V3	26	Western Europe	Yes	0.8319	0.8245	0.9462	0.8675	0.8272
Latvia	V3	29	Northern Europe	Yes	0.8135	0.9284	0.8378	0.8599	0.7798
Ireland	V3	30	Northern Europe	Yes	0.7796	0.9618	0.8287	0.8567	0.8433
Greece	V2	33	Southern Europe	Yes	0.7753	0.9405	0.8206	0.8455	0.8021
Poland	V2	34	Eastern Europe	Yes	0.7929	0.9033	0.8348	0.8437	0.8531
Italy	V2	37	Southern Europe	Yes	0.8659	0.8606	0.7860	0.8375	0.8231
Portugal	V2	38	Southern Europe	Yes	0.7954	0.8665	0.8201	0.8273	0.8255
Belgium	V2	39	Western Europe	Yes	0.6899	0.9614	0.8294	0.8269	0.8047
Serbia*	V2	40	Southern Europe	No	0.8514	0.8332	0.7865	0.8237	0.7474
Russian Federation	V2	42	Eastern Europe	No	0.7368	0.9065	0.8053	0.8162	0.8244
Croatia	V2	44	Southern Europe	Yes	0.8108	0.8500	0.7711	0.8106	0.7745
Czech Republic	V2	45	Eastern Europe	Yes	0.6693	0.9114	0.8456	0.8088	0.8135
Ukraine*	V1	46	Eastern Europe	No	0.8148	0.8669	0.7270	0.8029	0.7119
Slovakia	V1	47	Eastern Europe	Yes	0.7260	0.8436	0.8328	0.8008	0.7817
Hungary	V1	51	Eastern Europe	Yes	0.7465	0.8345	0.7671	0.7827	0.7745
Bulgaria	V1	52	Eastern Europe	Yes	0.7092	0.8221	0.7984	0.7766	0.7980
Romania	V1	57	Eastern Europe	Yes	0.6814	0.8090	0.7954	0.7619	0.7605
Belarus	V1	58	Eastern Europe	No	0.5302	0.9011	0.8426	0.7580	0.8084

Sources: 2020 and 2022 United Nations E-Government Surveys.

Note: The ranking of Ukraine reflects the results of the assessment undertaken at the time of the Survey.

* Countries that moved from the high to the very high EGDI group in 2022.

Box 2.4   Serbia: focusing on digital skills and services delivery

The improved e-government ranking of Serbia may be attributed in part to the Government's renewed commitment to the E-Government Development Programme of the Republic of Serbia 2020-2022 and the Action Plan for its implementation. Although there are still segments of the population that have never used the Internet or a computer, notable progress is being made within the realm of public administration. According to a government survey, only 4 per cent of public sector employees (600 of 15,200) do not have basic computer skills. Most institutions (14 of 21) use the e-Government portal to provide information and services, and the Government is committed to investing in the improvement of digital services delivery. At present, only 35 per cent of the 1,700 public services offered are accessible electronically, though almost all public institutions (19 of 21) have data centres, and the majority (13) have internal information security policies in place.

Sources: 2022 Member States Questionnaire for Serbia; Serbia, Ministry of Public Administration and Local Self-Government, and others, "E-Government Development Programme of the Republic of Serbia 2020-2022 and Action Plan for its implementation", available at e-Government-Development-Programme-2020-2022-FINAL-2.pdf.

Figure 2.16   Countries in special situations in Europe, 2022
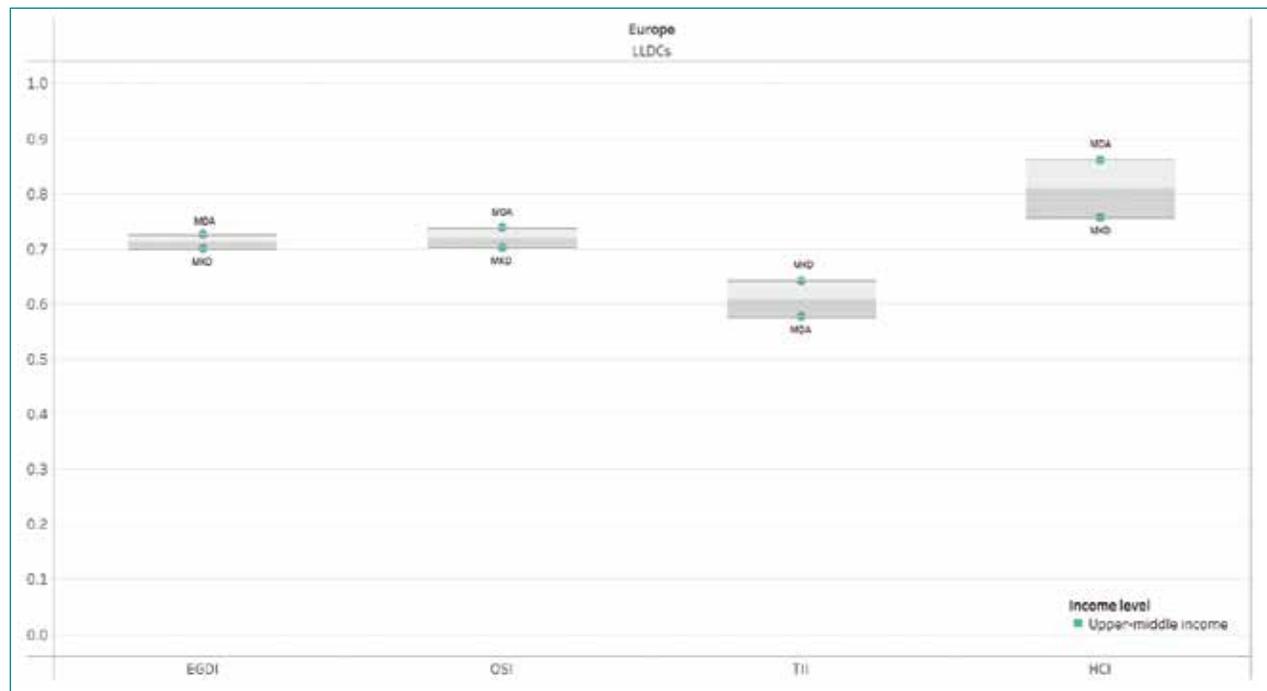
Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

2.2.8   Oceania: country grouping analysis

All 14 countries in Oceania are listed in table 2.6 owing to the small size of the region. Australia and New Zealand—with respective EGDI values of 0.9405 and 0.9432 and global rankings of 4th and 7th—are in the highest (VH) rating class of the very high EGDI group and are among the world leaders in e-government development. The countries in the high EGDI group include Fiji (0.6235), Tonga (0.5155) and Palau (0.5109), and the remaining countries are in the middle EGDI group. The countries in the region other than Australia and New Zealand have an average EGDI value of 0.4358—less than half the corresponding values of the regional front-runners and substantially lower than the global average of 0.6201. These 12 countries are all SIDS, and three of them (Kiribati, Solomon Islands and Tuvalu) are also LDCs. Vanuatu graduated from LDC status in 2020.

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

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
New Zealand	VH	4	Australia and New Zealand	0.9579	0.9823	0.8896	0.9432	0.9339
Australia	VH	7	Australia and New Zealand	0.9380	1.0000	0.8836	0.9405	0.9432
Fiji	H3	97	Melanesia	0.4813	0.7957	0.5935	0.6235	0.6585
Tonga	H1	124	Polynesia	0.3296	0.8675	0.3496	0.5155	0.5616
Palau	H1	132	Micronesia	0.2373	0.8946	0.3735	0.5018	0.5109
Vanuatu	MH	135	Melanesia	0.4228	0.6009	0.4727	0.4988	0.4403
Nauru	MH	139	Micronesia	0.2952	0.5925	0.4768	0.4548	0.4150
Kiribati	M3	148	Micronesia	0.3686	0.6785	0.2530	0.4334	0.432
Samoa	M3	152	Polynesia	0.3592	0.7470	0.1558	0.4207	0.4219
Tuvalu	M3	158	Polynesia	0.2265	0.6492	0.2607	0.3788	0.4209
Marshall Islands	M3	160	Micronesia	0.3004	0.6903	0.1236	0.3714	0.4055
Micronesia (Federated States of)	M2	164	Micronesia	0.2703	0.6845	0.1102	0.3550	0.3779
Solomon Islands	M2	164	Melanesia	0.3676	0.4925	0.1988	0.3530	0.3442
Papua New Guinea	M2	170	Melanesia	0.3263	0.4996	0.1430	0.3230	0.2827

Sources: 2020 and 2022 United Nations E-Government Surveys.

The least developed SIDS have the lowest EGDI values in the region (averaging 0.3884), mainly because of their poorly developed telecommunications infrastructure (reflected in the low average TII value of 0.2375). For comparison, all other SIDS in Oceania have an average EGDI value of 0.4516 and an average TII value of 0.3110—though the disparities in telecommunications infrastructure development are greater for this group than for the least developed SIDS (see figure 2.17). Oceania struggles to capitalize on its highly developed human capital (reflected in the average HCI value of 0.7268) and achieve meaningful progress in e-government development.

Figure 2.17   Countries in special situations in Oceania, 2022
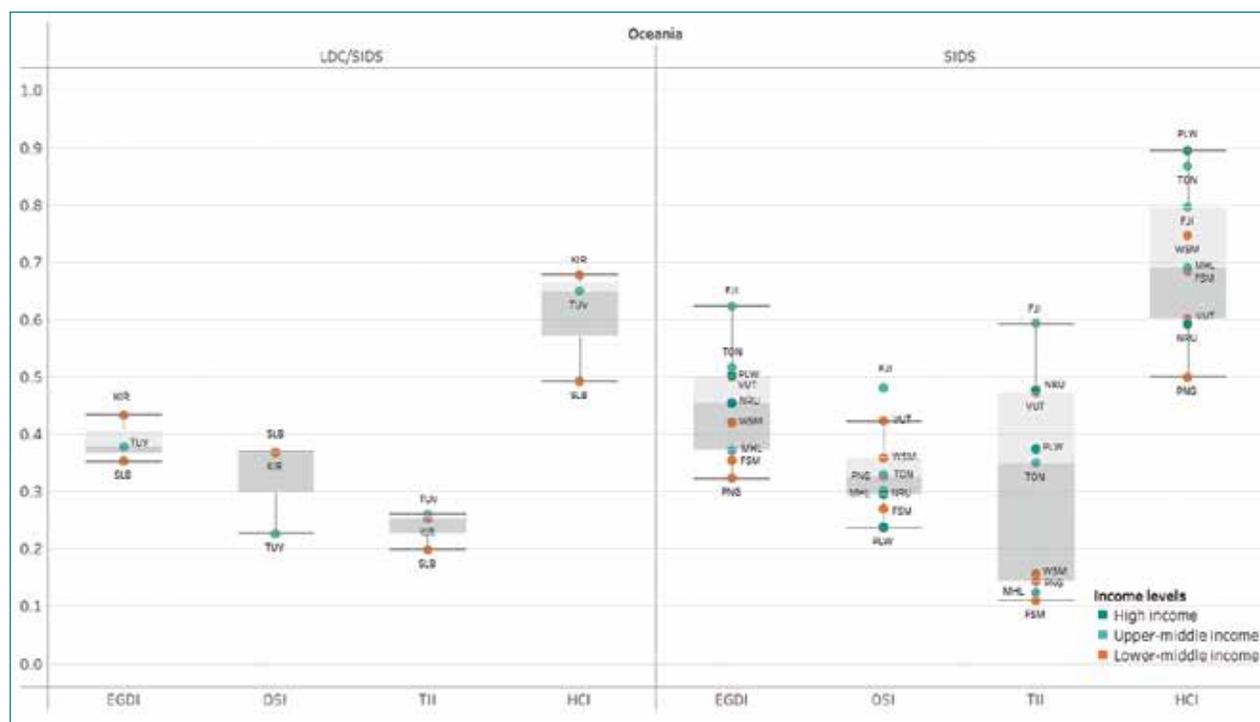
Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS).

The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

Box 2.5   Fiji: expanding the provision of digital services to improve accessibility

In Fiji, the Digital Government Transformation Programme (digitalFIJI) is being implemented as part of the 20-year National Development Plan and focuses primarily on strengthening public administration, government services, and the telecommunications infrastructure. Aiming to enhance the quality and accessibility of public services, the Government is working to achieve full digitalization by the end of 2022. The digitalFIJI website currently allows users to register births, apply for and retrieve birth certificates, and register companies or businesses. Two digital platforms have been created to facilitate communication and engagement. The Government Directory provides contact information for every public agency and public official, and the myFeedback platform provides users with an online space to discuss issues and comment on governance and government services; the latter project is handled by the Feedback Unit, which is responsible for promptly redirecting messages to the appropriate ministries and agencies for response and timely resolution.

Sources: 2022 Member States Questionnaire for Fiji; additional information on the services and platforms is available at https://www.fiji.gov.fj/digitalFIJI and https://carefiji.digitalfiji.gov.fj/about-us/.

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).[3] In some cases, these designations overlap.

Around 40 per cent of people living in poverty reside in LDCs, with most situated in countries experiencing or emerging from conflict. LDCs account for 13 per cent of the world population but only about 1.3 per cent of global gross domestic product (GDP) and less than 1 per cent of global trade and foreign direct investment (FDI). Although Internet use is increasing, only a fifth of the population of LDCs have access.[4] LDCs have weak human and institutional capacities, low and unequally distributed incomes, and a scarcity of domestic financial resources. Presently, there are 46 LDCs in various world regions.

LLDCs tend to face constraints in 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 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.

The combined average EGDI value for LDCs, LLDCs and SIDS rose by 3 per cent between 2020 and 2022 (from 0.4605 to 0.4736) but remains well below the world average of 0.6201 (see figure 2.18). LDCs have the lowest average EGDI value (0.3500) among the three special groups. When LDCs are excluded from the analysis of LLDCs and SIDS, the average EGDI values for the latter two groups are higher—0.5814 for SIDS and 0.6379 for LLDCs.

LLDCs comprise the only group among the countries in special situations that has an average EGDI value above the global average. The LLDCs also have the highest averages for the EGDI subindices (TII, HCI and OSI), followed by SIDS (see figure 2.19).

Figure 2.18   Average EGDI values for countries in special situations, 2020 and 2022
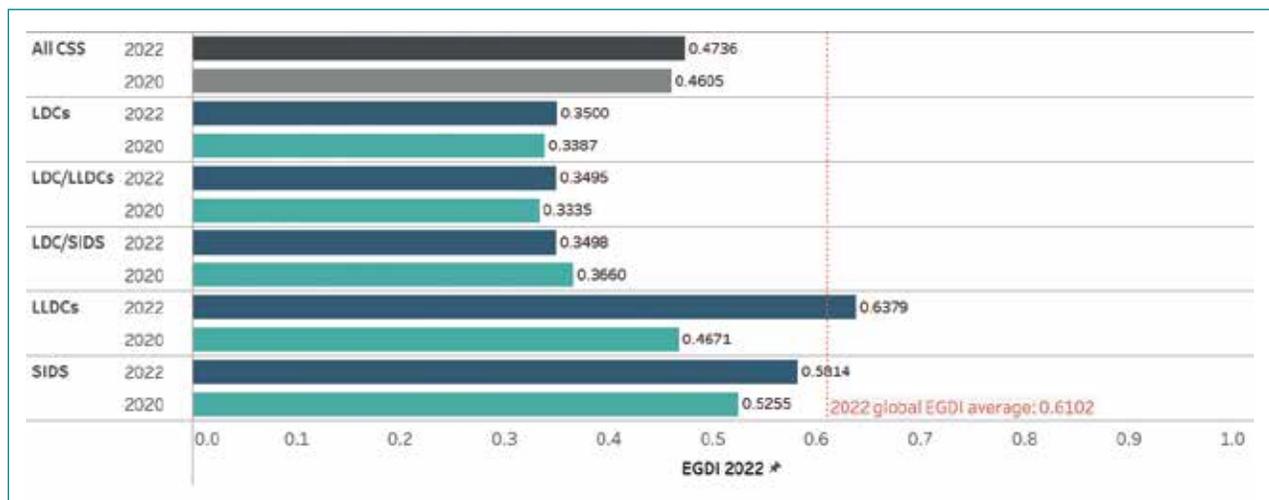
Sources: 2020 and 2022 United Nations E-Government Surveys.

Note: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS).

As shown in figure 2.19, the variance in subindex values for countries in special situations is pronounced within each distinct subgroup. While average EGDI values are roughly comparable for LDCs, including LDCs that are landlocked (LDC/LLDCs) and LDCs among the small island developing states (LDC/SIDS), the average OSI, TII and HCI values are different for each subgroup. For instance, landlocked LDCs perform significantly better than the LDCs among small island developing States in providing online services, while the latter subgroup has higher average values for human capital and infrastructure development.

Figure 2.19 EGDI and subindex values for countries in special situations, 2022

Sources: 2022 United Nations E-Government Survey.

Note: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS).

LDCs are concentrated in the middle EGDI group, though their share in this group has declined from 79 to 72 per cent over the past two years as their representation in the high EGDI group has nearly doubled, rising from 6 to 15 per cent (see figure 2.20). Among the LLDCs, 47 per cent have high EGDI values (unchanged from 2020) and 38 per cent have middle EGDI values (an increase of 4 percentage points since 2020). The proportion of SIDS in the high EGDI group increased from 50 to 55 per cent between 2020 and 2022, with a corresponding 5-percentage-point decline (from 42 to 37 per cent) in their representation in the middle EGDI group. Only 3 per cent of LLDCs and 5 per cent of SIDS have very high EGDI values, and there are no LDCs in this group.

Figure 2.20   The distribution of countries in special situations among EGDI levels, 2022
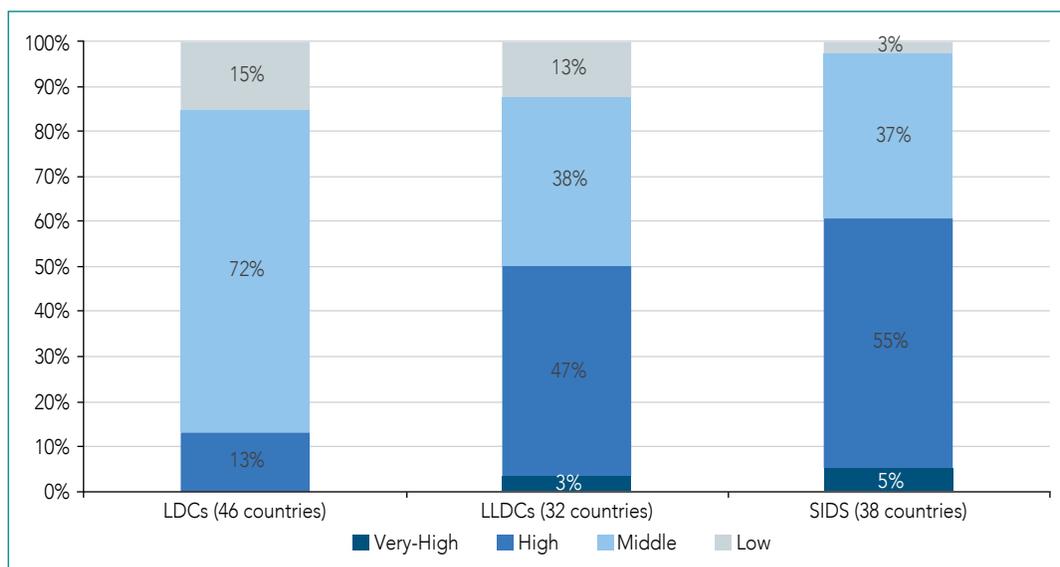
Source: 2022 United Nations E-Government Survey.

Note: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS).

2.3.1   Least developed countries

Among the 46 LDCs, 33 are in Africa, 9 are in Asia, 3 are in Oceania, and 1 is in Latin America. As noted previously, about 40 per cent of individuals living in poverty reside in the LDCs, most of which are experiencing or emerging from conflict. As also noted, LDCs account for 13 per cent of the world population but only about 1.3 per cent of global GDP and less than 1 per cent of global trade and FDI, and only a fifth of the people living in LDCs have Internet access.

Box 2.6   Cambodia

Cambodia is actively engaged in laying a strong foundation for digital transformation. In 2019, the Government adopted the E-Commerce Law and the Consumer Protection Law to guarantee security and fair competition in the electronic market. Draft legislation on information technology crimes, cybersecurity and access to information has also been drawn up to prevent and address cybercrime and ensure freedom of information. This year, the Government has committed to expanding digital development under the Cambodian Digital Government Policy 2022-2035, which aligns with the SDGs and the Digital Economy and Society Policy Framework 2021-2035. The National Council for Digital Economy and Society, one of the most esteemed institutions in the country, is responsible for implementing the latter strategy and has been selected to lead the e-government innovation process.

Sources: 2022 Member States Questionnaire for Cambodia.

With their transition from the middle to the high EGDI group in 2022, Rwanda, Nepal and Zambia join Bhutan, Bangladesh and Cambodia (which had made the same shift in 2020) as the leaders in e-government development among the LDCs. Their EGDI values place all six countries in the H1 or H2 rating class of the high EGDI group. Rwanda has had the sharpest increase in OSI value (from 0.6176 in 2020 to 0.7935 in 2022), making it the top performer in online services provision among the LDCs. The six LDCs in the high EGDI group have a high average HCI value (0.5715) and a middle average TII value (0.4596), signifying that these countries have had some success in advancing e-government development in spite of some limitations in telecommunications infrastructure development. All of the countries except Bangladesh and Cambodia are also landlocked and therefore face additional challenges.

Among the LDCs, Guinea, Myanmar, Rwanda and Zambia have made significant strides in improving their EGDI rankings (each by more than 10 positions), despite being low-income and lower-middle-income economies. Table 2.7 displays the performance of the highest-ranked LDCs.

Figure 2.21 highlights the differences in EGDI and subindex values among the LDCs, including those that are also LLDCs and SIDS; the latter two groups are reviewed in the subsections below. It is worth noting that LDCs in Asia are lower-middle-income countries (with the exception of Yemen) and have a higher average EGDI value (0.4645) than the LDCs in Africa (0.3231).

Table 2.7   Least developed countries with the highest EGDI value

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
Bangladesh	H2	111	Southern Asia	0.6521	0.5900	0.4469	0.5630	0.5189
Bhutan	H2	115	Southern Asia	0.5996	0.5305	0.5261	0.5521	0.5777
Rwanda*	H1	119	Eastern Africa	0.7935	0.5322	0.3209	0.5489	0.4789
Nepal*	H1	125	Southern Asia	0.4592	0.5636	0.5123	0.5117	0.4699
Cambodia	H1	127	South-Eastern Asia	0.4181	0.5380	0.5605	0.5056	0.5113
Zambia*	H1	131	Eastern Africa	0.4414	0.6744	0.3909	0.5022	0.4242
Myanmar	MH	134	South-Eastern Asia	0.3073	0.5829	0.6082	0.4994	0.4316
Senegal	MH	143	Western Africa	0.4934	0.3478	0.5025	0.4479	0.4210
Uganda	MH	144	Eastern Africa	0.5169	0.5631	0.2472	0.4424	0.4499
Lesotho	MH	145	Southern Africa	0.3456	0.5950	0.3836	0.4414	0.4593

Sources: 2020 and 2022 United Nations E-Government Surveys.

Note: Italicized countries are LLDCs in addition to being LDCs.

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

Figure 2.21   EDGI and subindex performance for the least developed countries, 2022
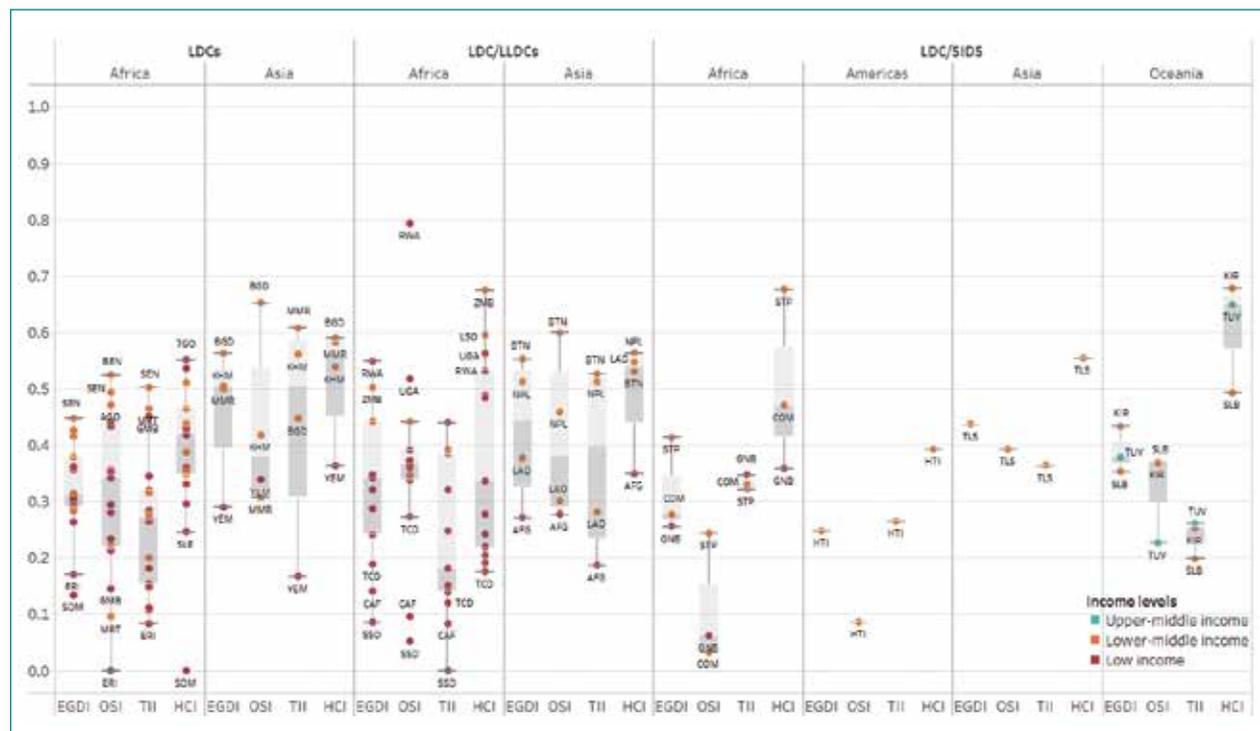
Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

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 (0.8628) and remains the only country in the second highest (V3) rating class of the very high EGDI group. Next are Armenia, Uzbekistan, the Republic of Moldova and Mongolia, which are in the highest (HV) rating class of the high EGDI group and are on the cusp of transitioning to the very high EGDI group. Between 2020 and 2022, Tajikistan, Rwanda, Nepal and Zambia moved from the middle to the high EGDI group (the latter three countries are also LDCs, as noted previously). Mongolia, Turkmenistan, Uzbekistan and Zambia are the LLDCs that experienced the most dramatic improvement in EGDI values and ranking during this period, with each of these countries raising its EGDI rank by more than 17 positions.

There are 17 countries classified as LDC/LLDCs. The average EGDI value is lower for this group than for other landlocked developing countries. Among the 13 LDC/LLDCs in Africa, 85 per cent are low-income countries, and three of the four LDC/LLDCs in Asia are lower-middle-income countries.

Among the remaining 15 LLDCs, 8 are in Asia, 3 are in Africa, 2 are in the Americas, and 2 are in Europe, and their respective average EGDI values are 0.6778, 0.4903, 0.6248 and 0.7125. More than half of these countries (53 per cent) are in the upper-middle income group, and the remainder are lower-middle-income countries.

Table 2.8   Landlocked developing countries with the highest EGDI values

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
Kazakhstan	V3	28	Central Asia	0.9344	0.9021	0.7520	0.8628	0.8375
Armenia	HV	64	Western Asia	0.7221	0.7945	0.6925	0.7364	0.7136
Uzbekistan	HV	69	Central Asia	0.7440	0.7778	0.6575	0.7265	0.6665
Republic of Moldova	HV	72	Eastern Europe	0.7380	0.8613	0.5760	0.7251	0.6881
Mongolia	HV	74	Eastern Asia	0.6263	0.8391	0.6973	0.7209	0.6497
North Macedonia	H3	80	Southern Europe	0.7020	0.7562	0.6417	0.7000	0.7083
Kyrgyzstan	H3	81	Central Asia	0.6176	0.8119	0.6637	0.6977	0.6749
Azerbaijan	H3	83	Western Asia	0.6119	0.7932	0.6761	0.6937	0.7100
Paraguay	H3	94	South America	0.6059	0.6947	0.5989	0.6332	0.6487
Bolivia (Plurinational State of)	H2	98	South America	0.5193	0.7483	0.5818	0.6165	0.6129
Bhutan	H2	115	Southern Asia	0.5996	0.5305	0.5261	0.5521	0.5777
Botswana	H1	118	Southern Africa	0.2740	0.6932	0.6814	0.5495	0.5383
*Rwanda**	H1	119	Eastern Africa	0.7935	0.5322	0.3209	0.5489	0.4789
*Nepal**	H1	125	Southern Asia	0.4592	0.5636	0.5123	0.5117	0.4699
Tajikistan*	H1	129	Central Asia	0.3968	0.7380	0.3770	0.5039	0.4649
*Zambia**	H1	131	Eastern Africa	0.4414	0.6744	0.3909	0.5022	0.4242

Sources: 2020 and 2022 United Nations E-Government Surveys.

Note: Italicized countries are LDCs in addition to being LLDCs.

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

Box 2.7   Armenia: aligning public administration priorities with SDGs

Armenia has been pursuing its Digitalization Strategy for 2021-2025, whose strength derives to some extent from its alignment with both the Public Administration Reform strategy and the SDGs. With support from the World Bank, e-government innovation projects have been launched this year, but some of the digital transformation initiatives developed to meet the objectives set out in the 2030 Agenda have already been undertaken. The E-Health in Armenia project, now in the implementation phase, provides medical professionals with up-to-date digital records and information on patient health, contributing to time and cost optimization in the health-care sector and allowing Armenia to move closer to achieving SDGs 3 and 10. Digitalization in the agriculture sector has also begun, with the Government using drone imagery and satellite technology to collect real-time data and statistics that can guide decision-making in areas relating to SDGs 2 and 8. One of the next steps is to develop an e-justice system that will contribute to the achievement of SDG 16.

Sources: 2022 Member States Questionnaire for Armenia; National Electronic Health Operator, "E-health in Armenia" (2022), available at https://corporate.armed.am/en/about-system/ehealth-in-armenia; Armenia, "National pathway for food systems transformation in support of the 2030 Agenda", Food Systems Summit 2021 Dialogues, available at https://summitdialogues.org/wp-content/uploads/2021/09/Armenia_National-Pathway_2021_En.pdf; World Bank, "Armenia to improve public sector performance through digital solutions, with World Bank support", press release, 3 March 2022, available at https://www.worldbank.org/en/news/press-release/2022/03/03/armenia-to-improve-public-sector-performance-through-digital-solutions-with-world-bank-support.

Figure 2.22   EDGI and subindex performance for landlocked developing countries, 2022
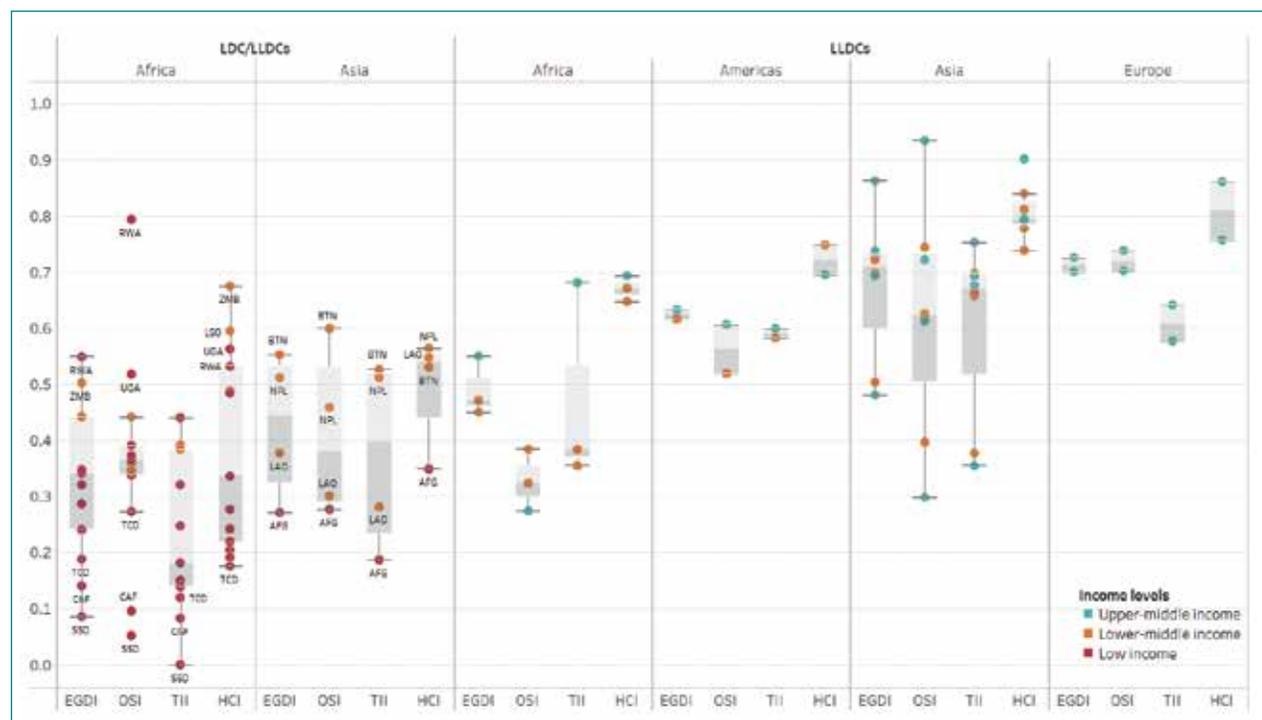
Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12.

2.3.3   Small island developing States

Table 2.9 presents the SIDS with the highest EGDI values in 2022. SIDS are characterized by the highest variance in EGDI values, which range from 0.2481 in Haiti to 0.9133 in Singapore. The latter is in the highest (VH) rating class of the very high EGDI group and is one of the world leaders in e-government development. Bahrain remains the only SIDS other than Singapore in the very high EGDI group, though this country saw its EGDI value decline from 0.8213 in 2020 to 0.7707 in 2022, with a corresponding drop from the V2 to the V1 rating class.

The other 21 countries featured in the table are all in the high EGDI group and have an average EGDI value of 0.6115—an improvement over the corresponding figures for 2020 (19 countries in the high EGDI group and an average EGDI value of 0.5716). Only 12 of the 38 SIDS (Antigua and Barbuda, Bahamas, Bahrain, Barbados, Dominican Republic, Fiji, Grenada, Mauritius, Saint Kitts and Nevis, Seychelles, Singapore, and Trinidad and Tobago) have EGDI values above the global average of 0.6201.

In 2022, Guyana and Belize transitioned from the middle to the high EGDI group, and Guinea-Bissau transitioned from the low to the middle EGDI group.

Table 2.9   Small island developing States with the highest EGDI values

Country	Rating class	EGDI rank	Subregion	OSI value	HCI value	TII value	EGDI (2022)	EGDI (2020)
Singapore	VH	12	South-Eastern Asia	0.9620	0.9021	0.8758	0.9133	0.9150
Bahrain	V1	54	Western Asia	0.7523	0.8154	0.7444	0.7707	0.8213
Grenada	HV	66	Caribbean	0.5507	0.8977	0.7348	0.7277	0.5812
Bahamas	HV	66	Caribbean	0.6214	0.7641	0.7976	0.7277	0.7017
Mauritius	HV	75	Eastern Africa	0.6282	0.7733	0.7588	0.7201	0.7196
Barbados	H3	79	Caribbean	0.5388	0.8645	0.7318	0.7117	0.7279
Seychelles	H3	85	Eastern Africa	0.4424	0.7758	0.8198	0.6793	0.6920
Saint Kitts and Nevis	H3	87	Caribbean	0.3307	0.8724	0.8293	0.6775	0.6352
Dominican Republic	H3	92	Caribbean	0.6183	0.7539	0.5567	0.6429	0.6782
Trinidad and Tobago	H3	93	Caribbean	0.4892	0.7409	0.6717	0.6339	0.6785
Fiji	H3	97	Melanesia	0.4813	0.7957	0.5935	0.6235	0.6585
Antigua and Barbuda	H2	99	Caribbean	0.4231	0.8128	0.5981	0.6113	0.6055
Jamaica	H2	102	Caribbean	0.4914	0.7148	0.5658	0.5906	0.5392
Maldives	H2	104	Southern Asia	0.4873	0.6937	0.5845	0.5885	0.5740
Saint Vincent and the Grenadines	H2	107	Caribbean	0.4526	0.7420	0.5486	0.5811	0.5605
Suriname	H2	108	South America	0.3418	0.6921	0.7089	0.5809	0.5154
Dominica	H2	109	Caribbean	0.2954	0.6810	0.7604	0.5789	0.6013
Cabo Verde	H2	110	Western Africa	0.4965	0.6507	0.5507	0.5660	0.5604
Saint Lucia	H2	114	Caribbean	0.4007	0.7049	0.5683	0.5580	0.5444
Guyana*	H1	123	South America	0.4509	0.6546	0.4643	0.5233	0.4909
Tonga	H1	124	Polynesia	0.3296	0.8675	0.3496	0.5155	0.5616
Palau	H1	132	Micronesia	0.2373	0.8946	0.3735	0.5018	0.5109
Belize*	H1	133	Central America	0.4425	0.6707	0.3882	0.5005	0.4548

Sources: 2020 and 2022 United Nations E-Government Surveys.

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

Figure 2.23 reflects the persistent challenges that continue to undermine the efforts of SIDS to improve their telecommunications infrastructure, online services provision and human capital development. The eight SIDS that are also LDCs (Comoros, Guinea-Bissau, Haiti, Kiribati, Sao Tome and Principe, Solomon Islands, Timor-Leste and Tuvalu) have a lower average EGDI value (0.3498) than do the other SIDS (0.5814). They also tend to have low TII and OSI values, as nearly all LDC/SIDS are low-income or lower-middle-income countries and lack the resources needed to invest in areas vital for e-government development.

Among the other SIDS, Asia has the highest average EGDI value (0.7339), followed by Africa (0.6551), the Americas (0.6094) and Oceania (0.4516). Most SIDS in Asia and the Americas are upper-middle-income and high-income countries, whereas in Africa and Oceania national income levels vary widely.

If e-government leaders such as Singapore and Bahrain are excluded from the analysis of e-government performance among SIDS, the average EGDI value for this group becomes 0.5628 (lower than the global average), reflecting the capacity constraints experienced by these countries as a consequence of their small size, remoteness and dispersion.

Box 2.8   Grenada

Grenada is on its way to becoming a Smart Small State, defined by the United Nations Development Programme (UNDP) "as one that leverages the power of data and digital technologies to strengthen the country's resilience, enhance sustainability, and improve the well-being of its people by creating economic opportunity that is led by an agile and efficient Government". Its collaboration with UNDP has allowed Grenada to extend the national digital strategy into the National Sustainable Development Plan 2020-2035, aimed at guiding the country's efforts to become a Smart Small State and achieve the SDGs. Over the past two years, Grenada has launched some innovative initiatives to address climate change. The Blue Bot project uses artificial intelligence to analyse images captured by underwater reef robots and monitor species and climate change patterns to better guide conservation efforts and sustainable fisheries management. On land, data are collected as part of the Climate Smart Agriculture and Rural Enterprise Programme to monitor real-time changes in climate, soil conditions and market prices, and the information gathered is used to guide decision-making across the food supply chain to promote more climate-resilient and sustainable agriculture. As part of the Climate Resilient Infrastructure for Integrated Landscape initiative, the Government has launched an app to provide citizens with real-time information via mobile alerts on how to respond during natural disasters. The next step is a smart government programme to digitalize public administration, provide high-quality online services, and create an innovation hub platform to meaningfully engage citizens.

Source: United Nations Development Programme, Barbados and the Eastern Caribbean, *Grenada Smart Small State: Developing the Vision* (quoted portion from p. 3), available at https://www.undp.org/barbados/publications/grenada-smart-small-state-developing-vision.

Figure 2.23   EDGI and subindex performance for small island developing States, 2022
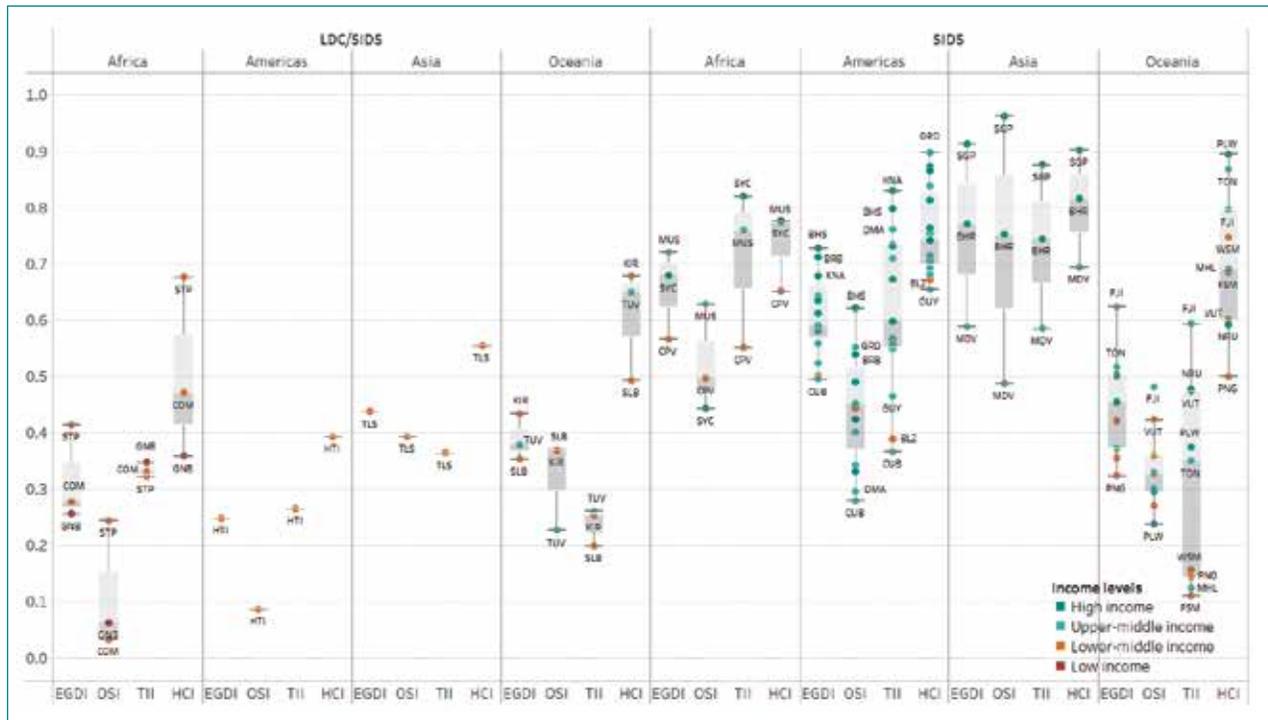
Source: 2022 United Nations E-Government Survey.

Notes: Countries in special situations include least developed countries (LDCs), landlocked developing countries (LLDCs), and small island developing States (SIDS). The internationally recognized three-letter country codes can be found here and in Survey annex table 12

2.4   Summary and conclusion

All regions except Oceania have improved their average EGDI values in 2022. Europe remains the leader in e-government development, with an average EGDI value of 0.8305, followed by Asia (0.6493), the Americas (0.6438), Oceania (0.5081), and Africa (0.4054).

For the first time since 2016, the average EDGI value for Oceania has declined, largely owing to the 29 per cent drop in the average TII value for the region over the past two years. The opposite is true in other regions, where much of the increase in regional EGDI values derives from improvements in the telecommunications infrastructure; between 2020 and 2022, the average TII value rose by 12 per cent in Africa, by 6.5 per cent in the Americas, and by 4.6 per cent in Asia.

Despite the significant progress made in Africa, the EGDI average for this region remains below the global average of 0.6102. Only 4 of the 54 countries in Africa have EGDI values above the global EGDI average, but the other countries have EGDI values that are sometimes significantly lower, highlighting gaps in e-government development and the persistence of the digital divide.

Asia and the Americas are roughly comparable in their levels of e-government development, with a growing number of countries in these regions moving to higher EGDI levels.

There has been notable progress in online services provision in all regions. Those living in vulnerable situations—people living in poverty, persons with disabilities, older people, immigrants, women and youth—have benefited from these improvements, though additional efforts are needed to ensure that no one is left behind in e-government. In regional terms, Europe has the largest proportion of countries offering services to vulnerable populations (96 per cent), followed by Asia (85 per cent), the Americas (83 per cent), Oceania (68 per cent) and Africa (64 per cent).

The 2022 Survey results indicate that Europe has the highest average number of services offered online (19), followed by Asia (17), the Americas (16), Oceania (12) and Africa (12). In 2022, for the first time, there are five countries in Africa offering 20-21 services (Nigeria, Rwanda, Angola, Egypt and South Africa). In all regions, registering a business and applying for business licence are the two services offered most frequently online.

Governments in all regions have been addressing the challenges associated with the COVID-19 pandemic. Almost all countries in Europe have provided information and online solutions/platforms for distance learning and have offered online information and scheduling options for telehealth services, COVID-19 vaccinations, and medical tests. In Africa, the Americas, Asia, and Oceania, the majority of national Governments focus on services relating to distance learning and COVID-19 vaccinations, with fewer countries offering telehealth services and scheduling for medical tests.

More than a quarter of the United Nations Member States are classified as countries in special situations—a designation that includes LDCs, LLDCs and/or SIDS. The average EGDI value for these countries has increased by 3 per cent since 2020. Among the three special groups, LDCs have the lowest average EGDI value (0.3500). When LDCs are excluded from the analysis of LLDCs and SIDS, the average EGDI values for the latter two groups are higher—0.6379 for LLDCs and 0.5814 for SIDS. LLDCs constitute the only group among the countries in special situations with an average EGDI value above the global average of 0.6201.

While progress has been made in e-government development globally over the past two years, the regions that have been struggling remain vulnerable to deepening digital divides. As noted in this chapter, a number of countries in Africa and Oceania—in particular those in special situations—are progressing at a pace that is too slow to bridge these divides. Africa has made significant improvements in telecommunications infrastructure, building a solid foundation for accelerating the transition to digital government; however, as highlighted in the first chapter, the cost of mobile

broadband subscriptions as a percentage of per capita gross national income remains significantly higher in Africa than in other parts of the world. In Oceania, underdeveloped or unevenly developed telecommunications infrastructure is undermining the region's progress in advancing e-government development. Chapter 4 examines the challenges and opportunities surrounding efforts to leave no one behind in the hybrid digital society, and chapter 5 explores the future of digital government, shedding light on opportunities and global good practices that have the potential to bridge digital divides.

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   It should be noted that the Survey assessment took place in 2021, and the ranking reflects the results at the time of the assessment.

3   See the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, available at https://www.un.org/ohrlls/content/what-we-do.

4   United Nations, Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, "About least developed countries", available at https://www.un.org/ohrlls/content/about-least-developed-countries.

3. Local E-Government Development

3.1 Introduction

Our Common Agenda, a report presented by the Secretary-General to the General Assembly in 2021, highlights the importance of cities as "crucial and innovative drivers of global change today".[1] Cities play a central role in public life, and how they perform has a daily and direct impact on people. The Sustainable Development Goals (SDGs) recognize the transformative power of urbanization for development and the vital role local leaders play in driving global change from the bottom up. Local governments make policy and are catalysts for change. Most of the SDGs have targets that are directly or indirectly related to the daily operations of local and regional governments.

Opportunities to forge a strong connection between the SDGs and local communities exist primarily at the city or municipal level.[2] People interact more closely with local governments than with national authorities since the former deliver the vast majority of public services, making the provision of online services at the local level essential. Facilitating interaction and engagement with and within local communities is one of the main responsibilities of municipal authorities. The availability of public participation mechanisms is vital because genuine progress is impossible unless individuals have a way to express their needs, provide feedback, and influence the direction of local government policies and practices.

A growing number of people are living in cities. Urban populations are projected to increase in all regions, reaching 5.1 billion—or 60 per cent of the world population—by 2030.[3] In the coming decades, the rate of urbanization is expected to be higher in Africa and Asia than in other regions.[4] With urban expansion, more people will be accessing public services locally, so it is imperative that strong e-government structures are in place at this level to accommodate present and future demand.

Urban residents are twice as likely as those living in rural areas to use the Internet.[5] In Africa, the gap is even greater; half of the region's urban dwellers are online, compared with just 15 per cent of the rural population. In the least developed countries (LDCs), urban residents are almost four times as likely as rural residents to use the Internet (47 versus 13 per cent). The digital divide is also apparent within cities and regions, with wide internal disparities in Internet availability and use.

One of the most effective ways to improve e-government is to regularly assess and evaluate government portals.[6] As more people live in cities and access the Internet from urban areas, it follows that local government portals must be able to accommodate larger numbers of users. A well-functioning portal can make a city more liveable and local

Photo credit: pixabay.com

government more responsive, which can in turn make residents happier. UN DESA first integrated local e-government assessment in the *E-Government Survey* in 2018; the pilot study was limited to 40 cities evaluated on the basis of 60 indicators. In the 2020 edition, coverage expanded to 100 cities and 80 indicators. The 2022 edition features 86 indicators and assesses the most populous city in each of the 193 Member States of the United Nations in order to ensure the most extensive population coverage possible.

As noted in the UN-Habitat *World Cities Report 2020*,[7] "cities are rapidly deploying technology to address a wide range of urban challenges"; terms such as "smart solutions" and "smart cities" are often used to describe related efforts and objectives. Technology integration provides opportunities for cities to meet the SDGs, and progress in this area is accelerating; many innovative solutions have even been developed and implemented during the COVID-19 pandemic. The current Local Online Services Index (LOSI) study reveals how various information and communication technologies are being used, highlights challenges such as digital exclusion, and summarizes some ongoing trends.

The two previous editions of the LOSI study provided important information and insights on local e-government development around the world. Although overall trends have been encouraging, generally indicating steady growth and progress, there remains room for improvement. Problems with technology integration and content provision in local government websites need to be addressed, as do shortcomings in services provision and municipal participation. Overall conclusions point to the need for local governments to continue to work on strengthening e-government services in order to better serve their residents. The sections below highlight the results and major findings of the 2022 LOSI study.

3.2   Current status of local online services

3.2.1   Methodology

The 2022 LOSI comprises 86 indicators relating to five criteria: institutional framework (8), content provision (25), services provision (18), participation and engagement (17), and technology (18). The institutional framework dimension focuses on municipal e-government strategy, organizational structure, legislation governing access to information and privacy, and open data policy. 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 criterion is participation and engagement, which assesses the availability of mechanisms and initiatives for interaction and opportunities for public participation in local governance structures. 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, functionality, reliability, ease of navigation, visual appeal, and alignment with technology standards.

3.2.2   Current status of local e-government

The 2022 edition of the LOSI study is the first one to incorporate an assessment of e-government in the most populous city in each of the 193 Member States. Table 3.1 lists the cities in the very high category based on an analysis of 86 indicators (see annex I). Madrid and Berlin are ranked first, with nearly 98 per cent of the features assessed, followed by Tallinn and Copenhagen. Fifth place is shared by Dubai, Moscow, New York City and Paris, with Singapore and Shanghai ninth and tenth. It should be noted that even the cities ranked 11th to 20th have more than 85 per cent of the features assessed. The rankings are provided as a proxy for measuring and tracking local e-government development and show that many cities are very close to each other in terms of providing services online.

Among the 38 cities in the very high LOSI group, 20 are located in Europe, 10 in Asia, 6 in the Americas, and 2 in Oceania. None of the most populated cities in African countries are ranked

among the top 20. Madrid, New York, Tallinn, Moscow and Paris have ranked in the top 10 in the 2018, 2020 and 2022 editions, affirming the consistency of the LOSI methodology for the assessed cities over the years. Among other cities ranked in the top 10 this year, Copenhagen and Singapore are assessed for the first time in 2022 edition, while Berlin, Shanghai and Dubai were ranked in the top 20 in the previous edition.

Table 3.1   Cities in the very high LOSI category

City	Country	LOSI score	City	Country	LOSI score
Berlin	Germany	0.9767	Reykjavik	Iceland	0.8372
Madrid	Spain	0.9767	Helsinki	Finland	0.8256
Tallinn	Estonia	0.9535	Kiev	Ukraine	0.8256
Copenhagen	Denmark	0.9419	Riga	Latvia	0.8256
Dubai	United Arab Emirates	0.9186	Stockholm	Sweden	0.8256
Moscow	Russian Federation	0.9186	Manama	Bahrain	0.8140
New York	United States of America	0.9186	Almaty	Kazakhstan	0.8023
Paris	France	0.9186	Luxembourg City	Luxembourg	0.8023
Singapore	Singapore	0.9070	Vilnius	Lithuania	0.8023
Shanghai	China	0.8837	Montevideo	Uruguay	0.7907
Bogota	Colombia	0.8721	Seoul	Republic of Korea	0.7674
Buenos Aires	Argentina	0.8721	Tel Aviv	Israel	0.7674
Istanbul	Turkiye	0.8721	Toronto	Canada	0.7674
Tokyo	Japan	0.8605	Warsaw	Poland	0.7674
Zurich	Switzerland	0.8605	Brussels	Belgium	0.7558
Rome	Italy	0.8488	Oslo	Norway	0.7558
Sao Paulo	Brazil	0.8488	Riyadh	Saudi Arabia	0.7558
Vienna	Austria	0.8488	Sydney	Australia	0.7558
Auckland	New Zealand	0.8372	Zagreb	Croatia	0.7558

For the 2020 LOSI study, 100 cities were surveyed, and the 86 that had portals at the time were assessed; 83 of these cities are also included in the 2022 edition. Although comparing overall trends across different editions is complicated due to the substantial improvements in coverage, some straightforward comparisons can be made for the cities analysed in the two most recent editions. Figure 3.1 shows that notable progress has been achieved, with the number of cities in the very high and high categories increasing from 30 in 2020 to 46 in 2022—an indication of higher rates of implementation of the LOSI features over the past two years and improvements in government services provision. Cities in the middle and low categories decreased from 53 to 37, or by nearly 20 percentage points, during this period. Notably, Kiev and Riyadh moved from the middle to the very high LOSI level, and Minsk moved from the low to the high level, affirming that rapid progress— indicated here by the two-category leap in two years—is very possible.

Figure 3.1   Comparison of LOSI levels for 83 cities, 2020 and 2022 (Number of cities per category)
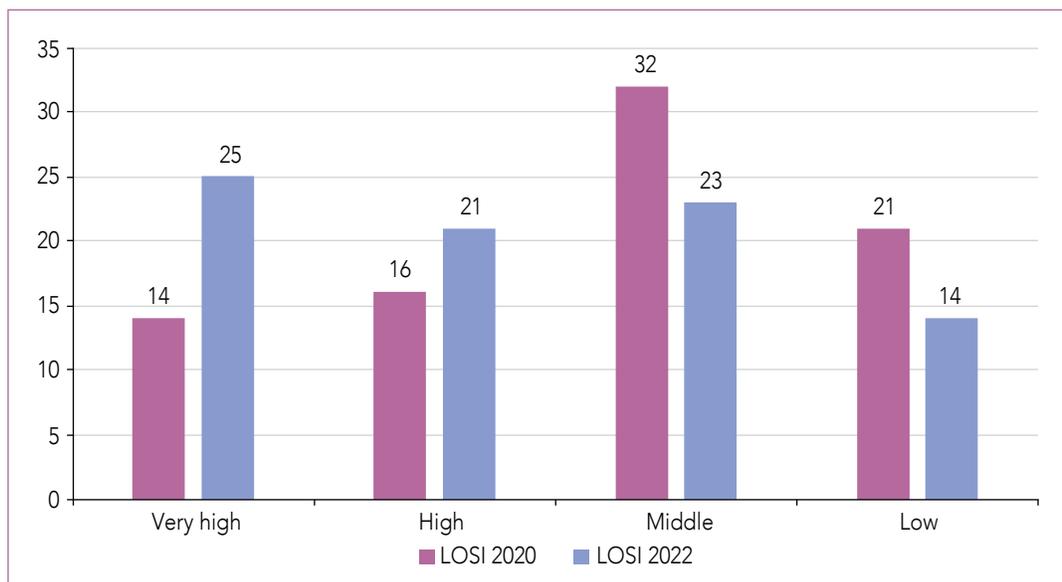
Among the 193 cities targeted for the 2022 LOSI survey, 146 have portals that are accessible and have been assessed. As in the previous edition, each city has been assigned to one of the four LOSI categories based on a final value. As shown in figure 3.2, 26 per cent of the cities surveyed meet more than 75 per cent of the indicators and are in the very high LOSI group, 25 per cent are in the high group, 31 per cent are in the middle group, and 18 per cent are in the low group. More robust comparisons of the digital development of municipal portals across the years will be carried out in the 2024 and successive LOSI editions.

Table 3.2 reflects the convergence or divergence between city portal development and national portal development in the respective countries surveyed based on a comparison of LOSI and Online

Figure 3.2   LOSI 2022 levels for the 146 cities assessed
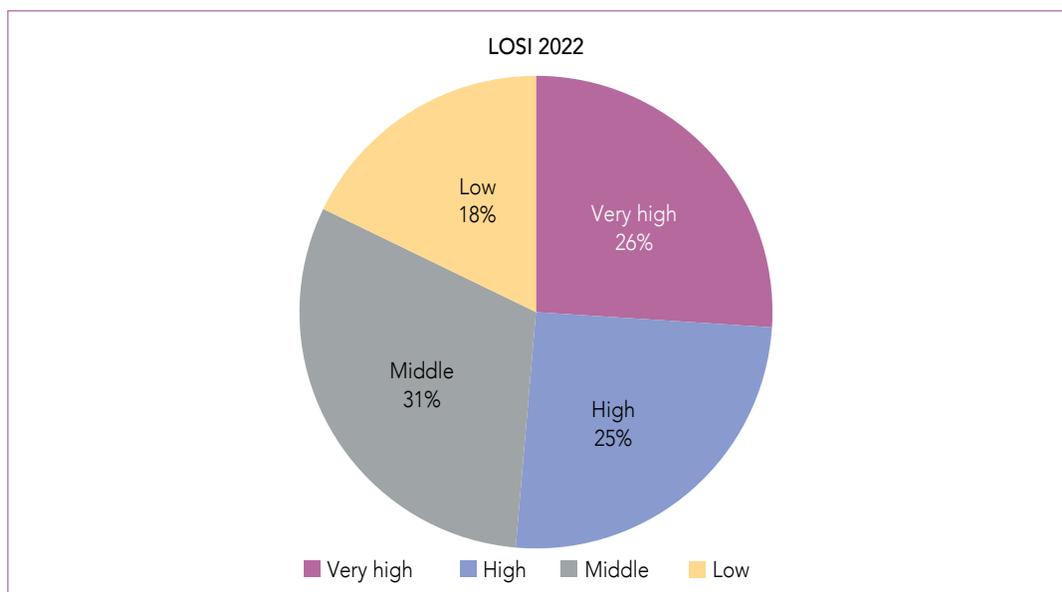
Service Index (OSI) values. The analysis does not include a direct comparison between LOSI and OSI indicators but highlights the discrepancies and concordances between the city websites and their national counterparts. Among the 146 city portals assessed in 2022, 81 are ranked at LOSI levels that correspond to their respective national levels (green-shaded cells), while 60 cities are ranked at LOSI levels lower than their respective countries' OSI levels (red-shaded cells). It is worth noting that five city portals are ranked at a level higher than their countries' OSI level (blue-shaded cells); Moscow, Bogota and Brussels are at the very high LOSI level, Monaco is at the high level, and Brazzaville is at the middle level. In the 2020 edition, only one city (Berlin) was ranked higher than its national counterpart.

Table 3.2   LOSI and OSI levels for 2022: convergence and divergence (number and percentage of cities)

	Very high OSI 2022	High OSI 2022	Middle OSI 2022	Low OSI 2022
Very high LOSI 2022	35 (24.0%)	3 (2.1%)	None	None
High LOSI 2022	16 (11.0%)	20 (13.7%)	1 (0.7%)	None
Middle LOSI 2022	2 (1.4%)	19 (13.0%)	23 (15.8%)	1 (0.7%)
Low LOSI 2022	None	3 (2.1%)	20 (13.7%)	3 (2.1%)

The 146 cities assessed for the 2022 LOSI have a total of approximately 500 million residents. For the 2022 LOSI study, extensive population coverage was deemed essential given urbanization trends and the desire to cover the largest number of people possible. Against this backdrop, the LOSI 2022 results have been analysed based on the cities' population size (as determined by population and urban agglomeration data from the UN DESA Statistics Division[8] and Population Division,[9] respectively). Among the 146 cities surveyed for the 2022 LOSI, 11 are megacities of 10 million people or more, 17 are large cities with 5 million to 10 million, 56 are medium-sized cities with populations of 1 million to 5 million, 31 are cities with 500,000 to 1 million residents, and 31 are urban settlements with fewer than 500,000 people. Figure 3.3 illustrates average LOSI 2022 values by population size. It may be observed that the groupings of cities with larger populations have a higher average value than do those with smaller populations. This makes sense, as larger cities have to provide services efficiently to a larger population and are more likely to have the resources to do so effectively.

Figure 3.3   Average LOSI 2022 values by population size
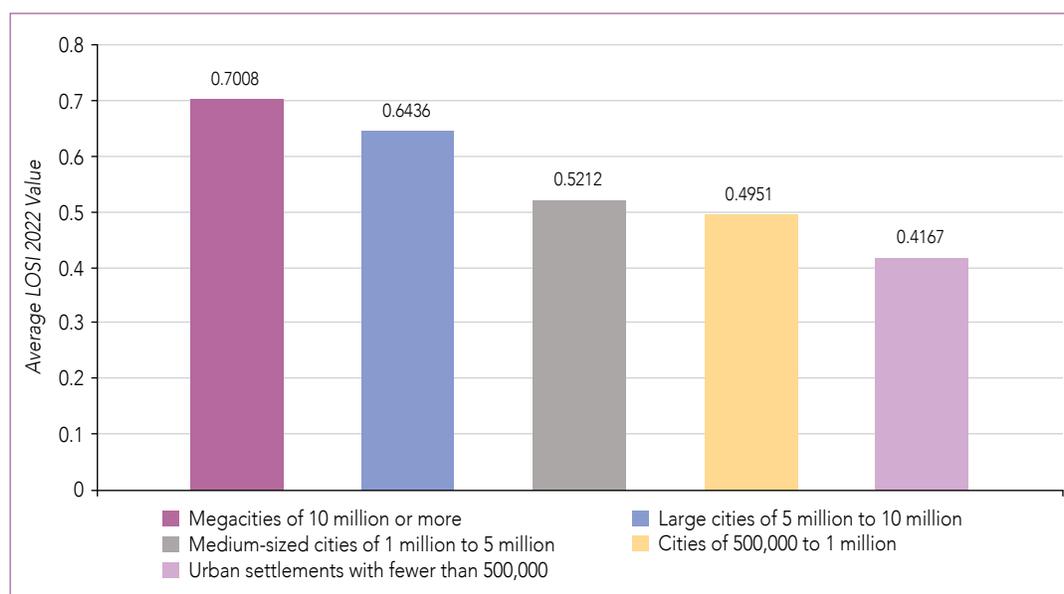
Implementation of LOSI indicators in city portals

As noted previously, institutional framework, content provision, services provision, participation and engagement, and technology are the five criteria featured in the 2022 LOSI. Some new indicators have been added and others have been reorganized to align with the OSI 2022 methodology. The newly introduced institutional framework criterion focuses on organizational structure and the legal and regulatory framework needed for local governments to develop an integrated institutional ecosystem.

As illustrated in figure 3.4, the highest compliance is observed for the institutional framework criterion, with the majority of cities meeting indicators such as providing contact information and clear information regarding the organizational structure. Similar to the LOSI 2020 findings, rates of compliance with content provision and technology indicators are also relatively high by virtue of the efforts made by municipalities to provide wide-ranging content relevant to local priorities such as health, environment, education and support for vulnerable groups and to extend access to portal functionality for all. Even for the services provision and participation and engagement criteria, where compliance is lower than for other criteria, concrete progress has been made since 2020. Cities are continuing to work on improving e-government performance and expanding service coverage, including through multi-channel service delivery. Many have developed targeted initiatives to strengthen interaction with the public, using social media and other means to increase e-participation.

Figure 3.4   Implementation of LOSI indicators in city e-government portals
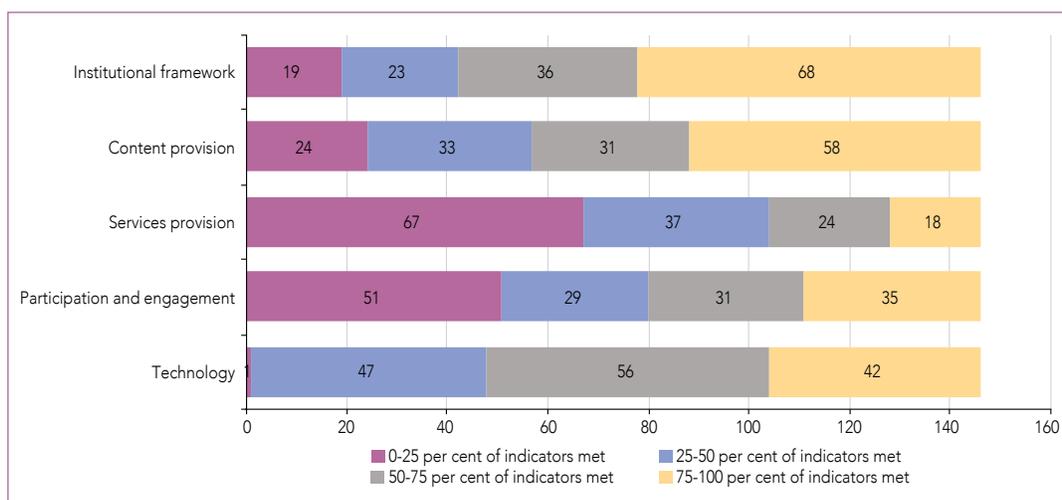
Highest ranked cities within each indicator category

The cities ranked highest for each indicator criterion are listed in table 3.3. In addition to highlighting the consistently high performance among the 10 cities with highest overall LOSI values for 2022 (see color coding), the table acknowledges the successes achieved by other cities assessed according to the five criteria.

Table 3.3   Leading cities assessed according to each LOSI 2022 criterion

Institutional framework		Content provision		Services provision		Participation and engagement		Technology	
City	Rank	City	Rank	City	Rank	City	Rank	City	Rank
Berlin	1	Berlin	1	Madrid	1	Berlin	1	Madrid	1
Madrid	1	Copenhagen	1	Copenhagen	1	Madrid	1	Tallinn	1
Tallinn	1	Dubai	1	Dubai	1	Paris	1	Tokyo	1
Copenhagen	1	New York	1	Berlin	4	Istanbul	1	Berlin	4
Dubai	1	Reykjavik	1	Moscow	4	Reykjavik	1	Dubai	4
Moscow	1	Tallinn	6	New York	4	Tallinn	6	Paris	4
New York	1	Moscow	6	Singapore	4	Helsinki	6	Shanghai	4
Paris	1	Istanbul	6	Shanghai	4	Kiev	6	Sao Paulo	4
Bogota	1	Tokyo	6	Tallinn	9	Copenhagen	9	Helsinki	4
Buenos Aires	1	Zurich	6	Santo Domingo	9	Singapore	9	Riga	4
Istanbul	1	Sao Paulo	6	Buenos Aires	11	Bogota	9	Stockholm	4
Zurich	1	Auckland	6	Vienna	11	Buenos Aires	9	Riyadh	4
Rome	1	Vilnius	6	Manama	11	Zurich	9	Monaco	4
Sao Paulo	1	Seoul	6	Almaty	11	Sao Paulo	9	Moscow	14
Vienna	1	Tel Aviv	6	Nairobi	11	Vienna	9	New York	14
Auckland	1	Toronto	6	Paris	16	Lisbon	9	Singapore	14
Reykjavik	1	Brussels	6	Bogota	16	Moscow	17	Istanbul	14
Helsinki	1	Madrid	18	Zurich	16	Tokyo	17	Rome	14
Stockholm	1	Paris	18			Rome	17	Lisbon	14
Montevideo	1	Singapore	18			Auckland	17	Amman	14
Seoul	1	Shanghai	18			Luxembourg City	17	Copenhagen	21
Tel Aviv	1	Bogota	18			Seoul	17	Bogota	21
Toronto	1	Rome	18			Toronto	17	Buenos Aires	21
Oslo	1	Vienna	18			Warsaw	17	Auckland	21
Sydney	1	Helsinki	18			London	17	Reykjavik	21
Zagreb	1	Kiev	18			Dublin	17	Manama	21
London	1	Luxembourg City	18			Tirana	17	Luxembourg City	21
Prague	1	Oslo	18			Panama City	17	Montevideo	21
Sofia	1	Zagreb	18					Guayaquil	21
Lima	1	Jakarta	18					Dublin	21
Johannesburg	1	London	18					Johannesburg	21

Institutional framework

As illustrated in figure 3.5, the most frequently satisfied institutional framework indicators are those that are relatively straightforward and easy to implement, such as providing clear information on the organizational structure of the municipality (85 per cent), providing name and contact information for the heads of departments (79 per cent), and providing links to other government agencies (77 per cent). Most of the municipal portals require authentication (such as a digital ID, login credentials or a mobile key) to access online services and restricted-access areas, demonstrating an awareness of cybersecurity.

Other institutional framework indicators are linked to the legal framework; this is an area in which a significant amount of time is generally needed to achieve real progress, so many cities will likely achieve higher LOSI values as relevant goals are met. Within this context, specific indicators focus on whether privacy policy statements and information on citizens' rights to access government information (including legislation guaranteeing freedom of information and access to information) are provided on the city portal; 53 and 50 per cent of the city portals assessed satisfy these respective indicators. Almost half (47 per cent) of the city portals have published their e-government or digital government strategy or the equivalent. Budapest, for example, ensures that users have information on the development and implementation of the one-stop-shop initiative, through which all local government e-services from almost all of the 3,178 local municipalities in Hungary are incorporated in the same platform. Finally, 41 per cent of the city portals publish their open government data policy online.

Figure 3.5   Implementation of institutional framework indicators in city portals (percentage of cities)
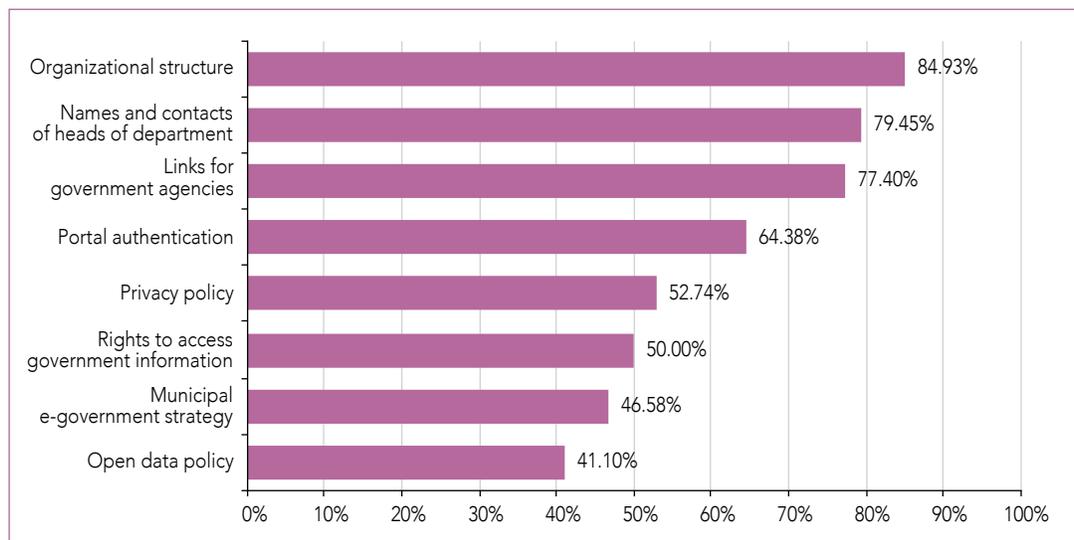
Content provision

Figure 3.6 highlights content provision indicators for specific sectors. Typically, the content that is of greatest relevance to residents at a particular point in time receives the most attention in city portals. For instance, the COVID-19 pandemic presently constitutes a public priority, so it is not surprising that health-related information is the most dominant feature in many city portals. The second most prevalent content relates to the environment. It is encouraging that nearly three quarters of the cities provide environment-related information focused on the potential contribution of cities to achieving the SDGs. Resident-oriented information linked to social welfare (71 per cent), education (68 per cent), employment (51 per cent) and justice (50 per cent) is also frequently found on city portals, showing that municipal strategies for online content provision are focused on the genuine needs of citizens.

Figure 3.6   Implementation of content provision indicators in city portals: sectoral information (percentage of cities)
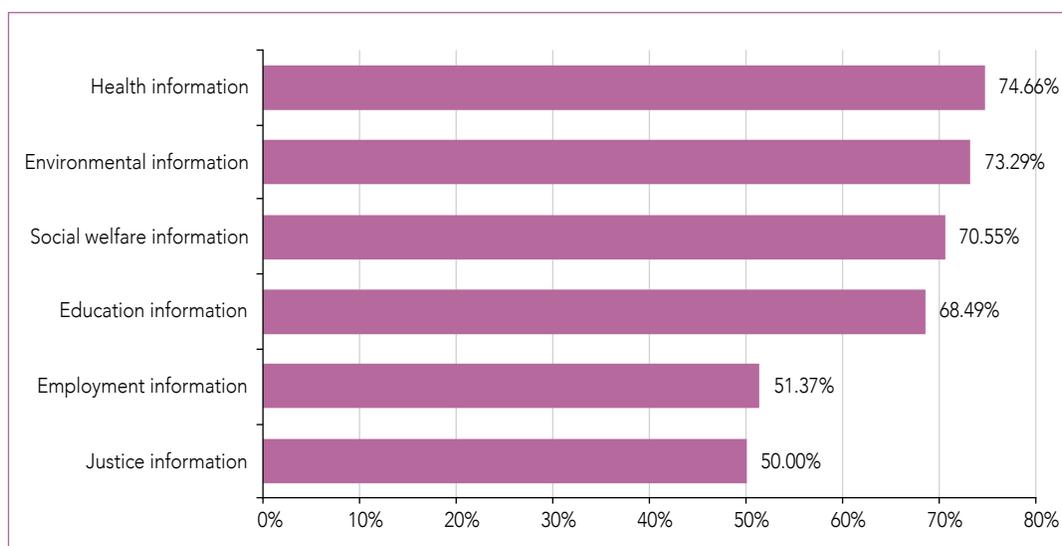
Figure 3.7 highlights the content provision indicators most closely related to day-to-day activities or everyday needs. With the higher population density in cities, interest and activity in the areas of employment, education, culture and entertainment are magnified. Cities offer spaces and opportunities for a wide range of social activities, so it is not surprising that sports and cultural information constitutes the content provided most frequently in the city portals surveyed. Some municipal authorities use their portals to promote and facilitate the implementation of public initiatives. In Iceland, for example, all parents who are legal residents of Reykjavík[10] receive a subsidy of 50,000 Icelandic króna for each child aged 6-18 to cover practice fees for sports and recreational activities. Cities are characterized by diversity, and it is important for municipal governments to address the needs of all members of the population; it is encouraging that 65 per cent of the cities surveyed provide information and access to services for vulnerable groups. City portals also have information on waste and recycling and on public transportation; the latter is particularly beneficial for visitors and third-party apps (such as Google Maps) that use transport information to provide services. As the digital divide is significant in many metropolitan areas, it is important that free Internet access be provided in public spaces. Among the cities surveyed in this edition, half share information about public Internet access points on their respective portals.

Figure 3.7   Implementation of content provision indicators in city portals: addressing everyday needs (percentage of cities)
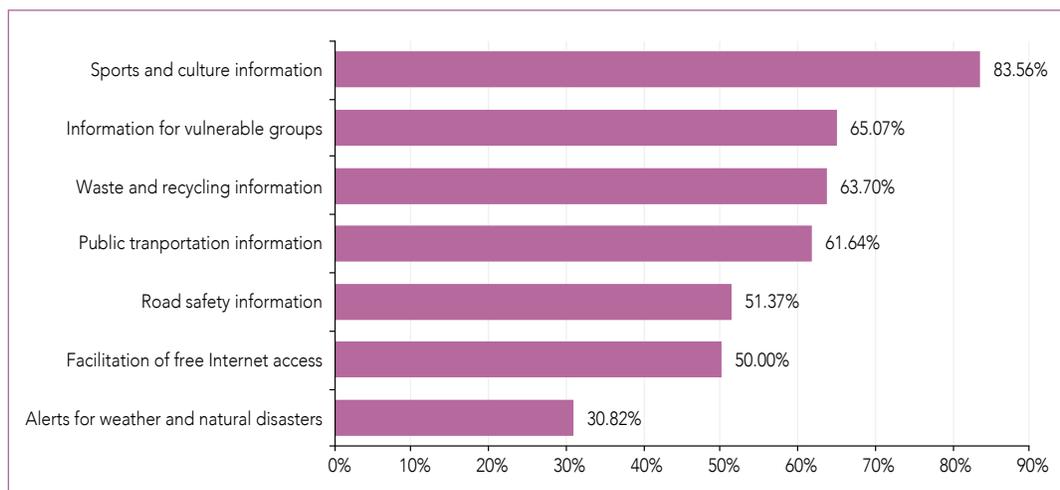
Public procurement—the purchase of goods, services or works by government authorities or public institutions or enterprises—is an important aspect of local government operations. Public officials are tasked with making choices that confer the greatest benefit to society and ensuring the optimal allocation of limited resources. Procurement portals help local governments achieve maximum return on investment while also ensuring transparency, efficiency and accountability. Almost three quarters (71 per cent) of the city portals assessed share upcoming procurement or bidding processes, but only 53 per cent share the results of these processes (see figure 3.8). In the United Arab Emirates, the Digital Marketplace / Abu Dhabi Government Procurement Gate - Al Maqta'a Portal has been set up to engage micro, small and medium-sized enterprises in transparent and efficient public procurement processes.[11] All organizations interested in doing business with Abu Dhabi government entities must complete the registration process—a centralized, one-time activity—through the Procurement Gate. Once potential suppliers are registered, their profiles are visible to buyers from all entities operating through the portal. In Port Louis, Mauritius, all procurement-related announcements and results are published and archived to ensure public transparency.

Figure 3.8   Procurement information on city portals (percentage of cities)
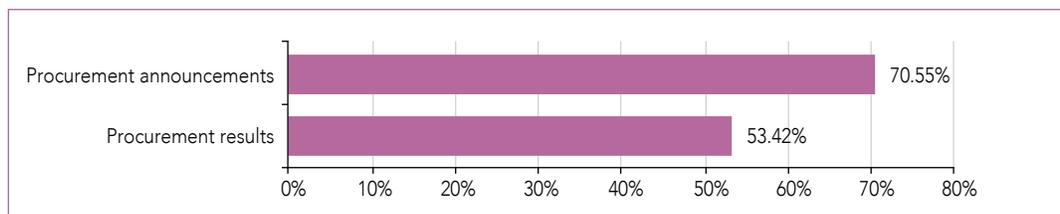
Services provision

The LOSI 2022 results indicate that services provision has the lowest level of compliance among the five criteria (see figure 3.4), echoing the trend observed in the 2020 findings. This suggests that city portals have not advanced much since the last survey or that most services are provided on the national portals, as is the case in Brazil. Although it is not necessary for city portals to replicate what is already incorporated in national portals, it is still worthwhile provide relevant links to national portals for the convenience of residents. Depending on the organizational structure and institutional framework for services provision at the national and subnational levels, local governments might have more or fewer responsibilities in terms of direct services administration through their own portals. The LOSI methodology accounted for this variability by specifying the scope of each indicator in the questionnaire, but the upshot here is that some services provision occurs at the national level, which is outside the bounds of the LOSI analysis.

Although complete comparability is impossible owing to the reorganization of some indicators in the most recent LOSI survey, parallels can be drawn between the questions that were analysed in this category across multiple editions. The proportion of cities providing an online payment system for municipal service fees and fines has increased from 47 to 58 per cent since 2020. Similar to the previous edition, 49 per cent of city portals include an online application system for government vacancies (see figure 3.9). Establishing e-procurement platforms for bidding processes and the submission of tenders has been one of the most consistent endeavours of municipal governments, with the share of city portals meeting this indicator rising from 35 to 48 per cent over the past two years.

Figure 3.9   Implementation of services provision indicators in city portals (percentage of cities)
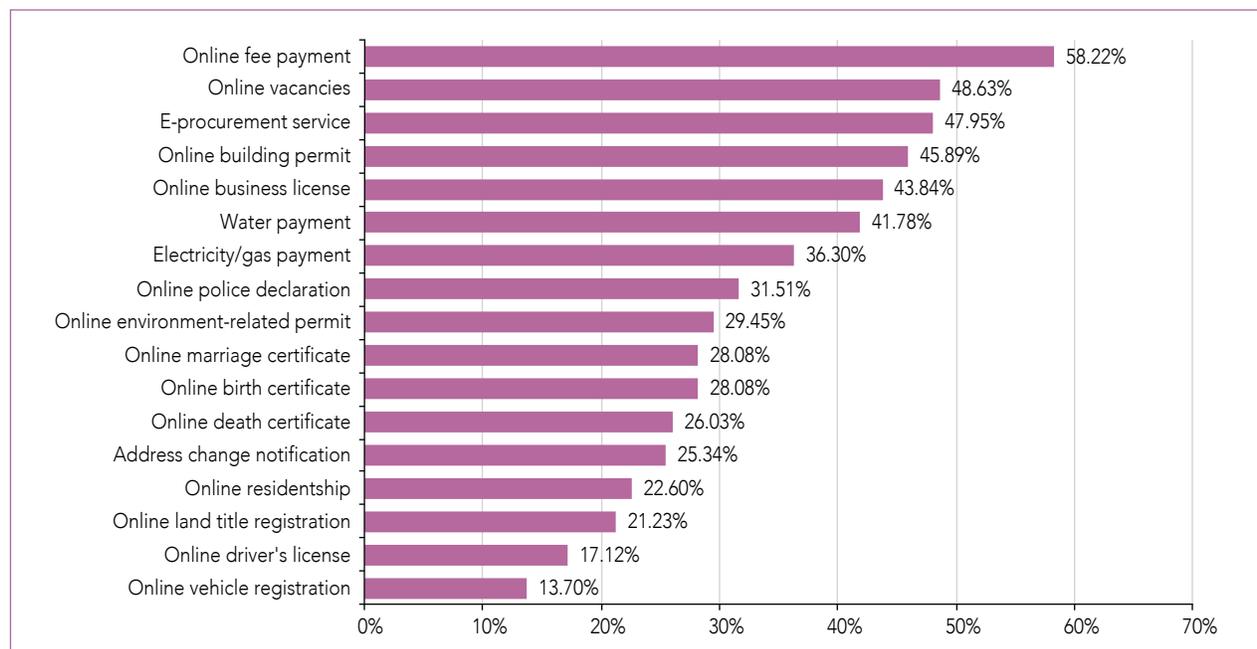
The provision of online building permits is now one of the most frequently met indicators, with compliance having jumped from 30 to 46 per cent between 2020 and 2022. The proportion of city portals providing online environment-related permits has also trended upward, rising from 23 to 29 per cent during this period. Those living in 42 per cent of the cities assessed can pay their water bills online, and 36 per cent of the city portals can be used by residents to pay their electricity and/or gas bills. The proportion of cities that allow their residents to make declarations to the police online has gone up from 27 to 32 per cent.

Just over a quarter of the cities surveyed provide online services linked to important life events; 28 per cent enable residents to obtain marriage and birth certificates through their local portals, while 26 per cent can supply death certificates. Around 25 per cent of the city portals allow residents to update their addresses, and 22 per cent are set up to process residence applications. Although some limited progress has been achieved since 2020, there are still relatively few local portals that allow residents to submit a driver's license application (17 per cent) or register a vehicle (14 per cent).

Participation and engagement

As illustrated in figure 3.10, the most frequently met participation and engagement indicator relates to social networking. More than 86 per cent of the cities assessed have social media accounts and use them to interact with local residents and visitors. Cities that completed the most recent Local Government Questionnaire (LGQ) also affirm the importance of social media networks within the realm of public participation and engagement. In Addis Ababa, for instance, almost all major city administrative offices have Facebook and Twitter accounts that are regularly updated by municipal communication offices. Residents receive real-time information on meetings, consultations, public engagement opportunities and infrastructure development, along with other public announcements.

There are also e-participation initiatives that are implemented at the national level and adopted by local governments. In Saudi Arabia, a dedicated portal called Balady offers a wide array of e-participation functions (e-information, e-consultation and e-decision-making) and tools, and it is integrated with municipal services so that local feedback on e-services can be obtained and improvements made. The Malaysian Administrative Modernisation and Management Planning Unit, as the lead agency for public sector digitalization, provides support for all public sector entities—including local authorities—to facilitate the development and implementation of e-participation platforms and mechanisms. In Peru, the national Government provides support to more than 2,400 local government authorities through the cloud-based Plataforma Participa Perú and Facilita Perú; these two platforms offer municipalities a simple way to launch and manage citizen consultations. In Bangladesh, communication and collaboration are facilitated at the country, municipal and rural local government levels through e-participation tools available on the national portal. In Japan, local governments are using open dialogue platforms developed by the national Government and operated by private companies and some of these platforms use open source software.

Around 80 per cent of the city portals assessed for the most recent LOSI study allow local residents to file complaints or provide feedback online, and 53 per cent are set up for the reporting of occurrences in public spaces. The LOSI and LGQ analyses for 2022 reveal that an increasing number of local governments allow their residents to report incidents related to services provision through their websites or mobile applications.

Although 71 per cent of the city portals assessed provide information related to the municipal budget, only 35 per cent allow local residents to participate in the budgeting process. The proportion of city portals sharing information on public meetings of the municipal council increased from 43 to 53 per cent between 2020 and 2022, and the share of those announcing upcoming e-participation activities rose from 28 to 40 per cent during this period. Almost 38 per cent of the city portals assessed in the 2022 LOSI study support the online participation of residents in land-use planning

Figure 3.10   Implementation of participation and engagement indicators in city portals (percentage of cities)

Indicator	Percentage
Social networking features	86.30%
Feedback/complaint submission	80.14%
Budget-related information	71.23%
Information on the public meetings of the municipal council	53.42%
Reporting of incidentsin public spaces	52.74%
Online deliberation processes	48.63%
Open data provision	45.89%
Open data metadata	41.10%
Announcement of upcoming e-participation activities	40.41%
Participatory land use plan	37.67%
Quality of email response	37.67%
Municipality responsiveness emails	36.99%
Participatory budgeting	34.93%
Feedback about consultation processes	31.51%
Report of any form of discrimination	29.45%
Real time communication	22.60%
E-voting	19.18%

(territorial organization, land management, land conversions and revision processes). E-voting services still constitute the least successful indicator, with only 19 per cent of city portals meeting this criterion. LGQ responses within the participation and engagement subgroup highlight different initiatives designed to collect input from residents for policy deliberations. The Mayor of London has created a platform for public engagement in policy and programme development; most recently, residents have been given the opportunity to contribute to the development of COVID-19 recovery strategies for London.

Among the city portals studied, only 23 per cent offer live chat support functionality for users. Some cities make non-real-time communication options available, providing contact forms or email addresses on their portals; 38 per cent of the cities assessed for the 2022 LOSI study reported responding to email inquiries in a timely manner.

Open data provision is vital not only to allow local governments to strengthen transparency, accountability and value creation by making government data available to all, but also to enable residents to participate in decision-making processes. Tallinn is noteworthy in this regard; the city provides open data sets for residents, researchers and institutions and also involves these stakeholders in urban development planning processes. At this point, fewer than half (46 per cent) of the city portals assessed for the LOSI 2022 study provide open data, and 41 per cent provide the relevant metadata for these publicly available data sets. LGQ responses indicate that many cities working on establishing open data portals have multiple initiatives focusing on different sectors and topics.

Technology

As illustrated in figure 3.11, the most frequently met technology indicators are browser compatibility (99 per cent), the integration of contact functions in the portal (98 per cent), and the ease with which portals can be found by users (96 per cent). The proportion of city portals accessible on mobile devices has dropped slightly (from 97 to 92 per cent)—possibly because of the broader coverage in the 2022 edition—but this is still one of the most frequently met indicators. It is reported that 88

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per cent of the city portals are compliant with markup validation or display standards and 84 per cent have an internal search function. Roughly four in five of the city portals are frequently updated to publicize events or to inform residents about services or e-government functions that have been added to the portal.

Among the portals assessed, 59 per cent provide a helpdesk call number to support residents who face difficulties in accessing services or completing tasks online or through other digital channels. A similar proportion of city portals (57 per cent) have a help feature or frequently asked questions section. Fewer municipal portals (45 per cent) offer guidance or tutorials for citizens to help them understand and use e-government services.

Most city portals still lack advanced search functions, with only 29 per cent satisfying this indicator. Compliance with Web Content Accessibility Guidelines (WCAG 2.0) is also relatively uncommon, with only 24 per cent of the city portals meeting the standards.

Figure 3.11 Implementation of technology indicators in city portals (percentage of cities)
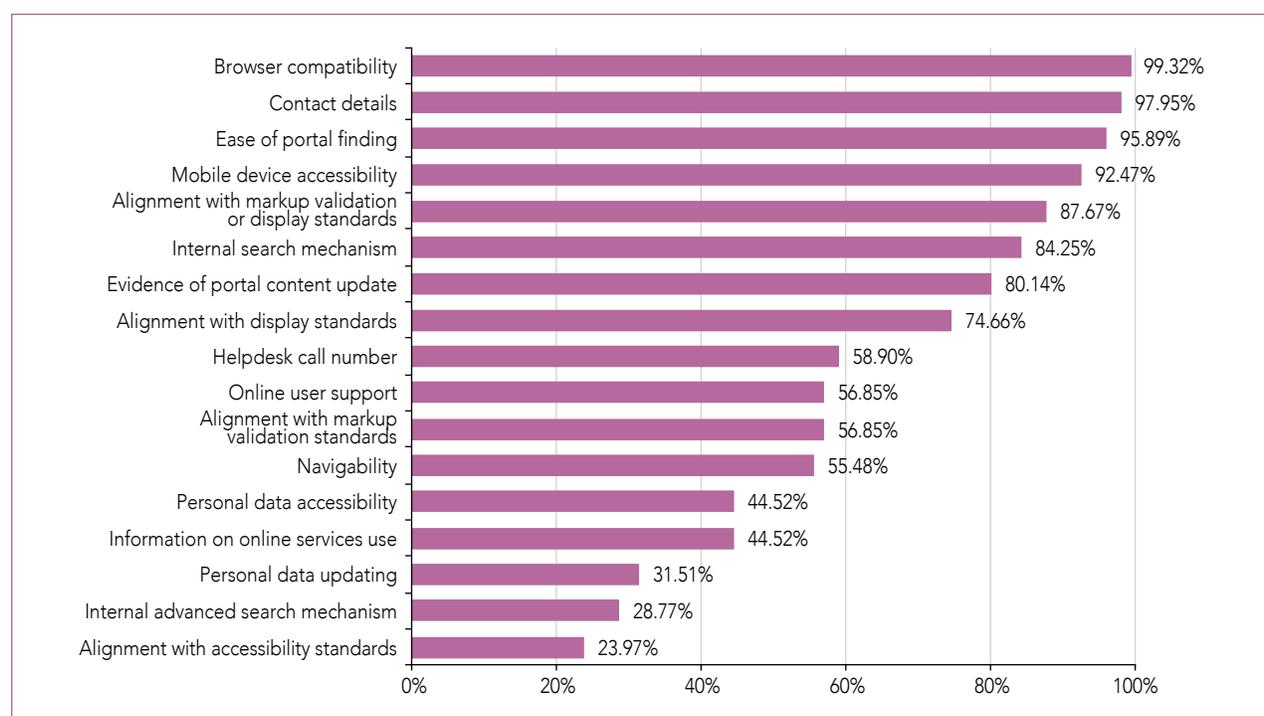
3.3   Local Government Questionnaire

The Local Government Questionnaire is a preparatory survey administered to support the LOSI process; the LGQ survey template may be found in the annex to the present publication. The Questionnaire was made available online in early 2021 and was also sent to municipalities. Only 42 cities—fewer than a third of those involved in the LOSI study—submitted responses, so the LGQ results do not represent the full picture for the LOSI-surveyed cities as a group. Any quantitative analysis mentioned in this section is based on the 42 submissions received. It is the expectation of UN DESA that more cities will participate in the LGQ over time, providing enriched input for future editions of the *E-Government Report*. The most recent LGQ incorporates eight sections: institutional framework, legal framework, strategy and implementation, usage of online services, user satisfaction, social media, COVID-19 measures, and smart city and new technologies for digital development in municipal governments.

3.3.1   Institutional framework

In the institutional framework section of the LGQ, cities were asked to provide links to major portals at the municipal level, including the official portal and any others that might be used for e-services, e-participation, open government data and procurement. The responses indicate that a significant number of the cities surveyed have dedicated portals for different services; about half use multiple official portals, while the other half prefer a one-stop-shop approach. Each strategy comes with pros and cons.

The LGQ asked whether the city has a chief information officer (CIO). Notably, 95 per cent of the respondents indicate that they have a municipal-level CIO who manages local e-government programmes and strategies. In most cases, the municipal CIO is linked to and works alongside the national CIO, which is important for local-national coordination. In some cases, municipal CIOs are linked to more than one ministry; in Indonesia, for example, they work with the Ministry of Administrative and Bureaucratic Reform for business processes and e-government services, with the Ministry of Communication and Information Technology for e-government infrastructure and applications, with the Ministry of National Development Planning for data and Information, and with the National Cyber and Crypto Agency for information security. In Bahrain, the CIO for the Capital Governorate (Manama) works closely with the national CIO in planning and implementing the national e-government strategy, which is closely aligned with the Government Action Plan (2019-2022) and the Bahrain Economic Vision 2030. In Quezon, Philippines, the city communicates with the Department of Information and Communications Technology regarding various programmes. In the United Arab Emirates, the Dubai Digital Authority (also referred to as Digital Dubai) was established in 2021 to develop strategies governing matters relating to information technology, data, digital transformation and cyber-security in coordination with the Smart Dubai Department, the Smart Dubai Government Establishment, the Dubai Data Establishment, the Dubai Electronic Security Center and the Dubai Statistics Center.

3.3.2   Legal framework

The legal framework section of the LGQ requested information on legislation relating to digital government and applied at the local level. The survey results indicate that laws affecting local e-government focus primarily on the following:

- *Electronic government*. Relevant laws may affirm the public's right to digital services or establish guidelines for implementation; in the latter case, legal requirements may have to be taken into account in the design and implementation of new digital services.

- *Free access to information*. Laws may relate to the disclosure of public information or access to information. Some regulations establish procedures for the classification of public information. There is also legislation governing the re-use of public administration documents.

- *The protection of personal data*. Most of the municipalities surveyed make reference to existing data protection legislation and the adaptation of national laws to local contexts. Some municipalities have set up dedicated offices or entities that oversee the implementation and application of national and local policies governing the processing of data for personal, commercial or official purposes. Seoul has been proactive in this regard, issuing an ordinance guaranteeing the safe management of personal information and protection of the rights of identifiable individuals pursuant to the Personal Information Protection Act. The city established the Personal Information Protection Commission, an administrative agency that independently conducts activities aimed at safeguarding personal information. Composed of 15 internal and external experts, the Commission is involved in developing polices and legislation relating to personal information protection.

- Public administration information systems. Relevant legislation might relate, for example, to base registries, access to websites and mobile applications for public sector bodies, electronic identification and electronic signatures, information security, and electronic documents. Although municipalities regulate the local digital government platform for all sectors, the national public administration services infrastructure is generally used, along with shared services such as base registries. Digital identity laws define the framework in which digital identity can be deployed. Laws on information security are implemented to ensure a more coordinated and effective response to data incidents across the Government.

Laws relating to digital government are generally adopted at the national level and applied by public entities at the local level. However, evidence of some relevant local legislation also exists. In Moscow, for example, an experimental legal regime for artificial intelligence (AI) projects was introduced in mid-2020. The legislation sets out the goals, objectives and main principles associated with the establishment of legal frameworks for the development and use of AI, focusing on new technologies and applications that are often not covered by existing regulations. The main objectives of this experiment are to stimulate the integration of AI technologies in the market and explore how they might be applied, to identify which sectors of the economy and social interaction would benefit most from the implementation of such technologies, and to provide solid regulations for anonymized data. After the experiment is concluded, decisions will be made on amendments to existing legislation.

3.3.3   Strategy and implementation

The strategy and implementation section of the LGQ naturally focuses on e-government strategy and implementation but also examines budget allocations and the establishment of partnerships with other cities, civil society and the private sector to achieve digital development goals. Most of the respondents (34 of 42, or 81 per cent) affirm that they have adopted an e-government strategy or the equivalent at the municipal level. Notably, 71 per cent of municipal e-government strategies are aligned with national development strategies, SDGs, and national strategies for digital development. SDG-oriented strategies include improving education, welfare, health care, transportation, mobility, safety, and the quality of life, as well as monitoring and improving the environmental situation. A relatively smaller number of municipal e-government strategies make specific reference to mobile government, a local digital ID, or co-creation mechanisms for residents.

When designed and implemented well and supported by a forward-looking development strategy, local e-government can simplify people's lives, provide multiple channels of contact and communication, and increase administrative efficiency. In Bogotá, the Smart Territory Plan 2020-2024 "seeks to have a direct impact on the lives of all the people … in the city-region, regardless of where they live or their sociodemographic features. The smart territory takes advantage of technology, data and innovation to generate capacities and talent, opportunities, empowerment and quality of life for men and women of Bogotá. This will be achieved with four initiatives: Education for the 4RI, Economy 4.0, Bogotá Open Government and the Digital Transformation Agendas."[12] Similarly, Prague has a municipal strategy for public ICT development designed to meet the digital service needs of the capital city until 2025.

Among the 42 LGQ respondents, 34 (81 per cent) have municipal digital development initiatives that focus on sustainability issues or achieving a green economy, and 38 (90 per cent) are involved in partnerships with other cities, civil society organizations and the private sector.

Budgetary support for digital transformation

A full 86 per cent (36) of the LGQ respondents have a budget for digital government projects, with more than half earmarking special funding for e-government transformation; seven cities have appropriated under 1 per cent of their municipal budget for digital development, eight have allocated 1 to 3 per cent, and six have allocated 3 to 8 per cent.

In 38 municipalities (90 per cent), the city budget is published on the local government portal to provide residents with access to public fiscal information. In some cases, links to archived budget documents are available. Generally, city budget documentation includes income projections and information on expenditure prioritization and the organization and allocation of resources.

Correspondence between per capita GDP and LOSI values

In the present edition of the *E-Government Survey*, the assessment of the relationship between per capita gross domestic product (GDP) and LOSI values focuses on cities within countries that are part of the Organization for Economic Cooperation and Development (OECD). In the 2020 *Survey*, the results seemed to point to a positive correlation between cities' LOSI levels and real GDP per capita; however, a review of LOSI 2022 values for OECD cities shows that for those with reasonable levels of wealth, there is not necessarily a direct correspondence between GDP and LOSI values. Figure 3.12 shows no real relationship between OECD city GDP levels and LOSI values. The lack of a correlation is illustrated through an insignificant regression (high P-value) with a low R²-value, indicating that a higher GDP offers relatively little value in explaining high LOSI values. All OECD cities have a relatively high GDP per capita, and their LOSI values and levels are high or very high (0.5-1.0). However, some OECD cities on the lower end of the GDP spectrum have LOSI values that exceed those recorded for cities at the upper end of the GDP scale. In the very high LOSI category, for example, are Bogota, with per capita GDP of $21,318 and a 2022 LOSI value of 0.8721, and Riga, with GDP of $39,704 and a LOSI value of 0.8256. Conversely, some cities with a very high GDP, such as Dublin ($94,997) and Amsterdam ($71,490), are only in the high category, with respective LOSI values of 0.686 and 0.697.

Figure 3.12   Lacking/absent correlation between 2022 LOSI values and OECD cities' GDP per capita
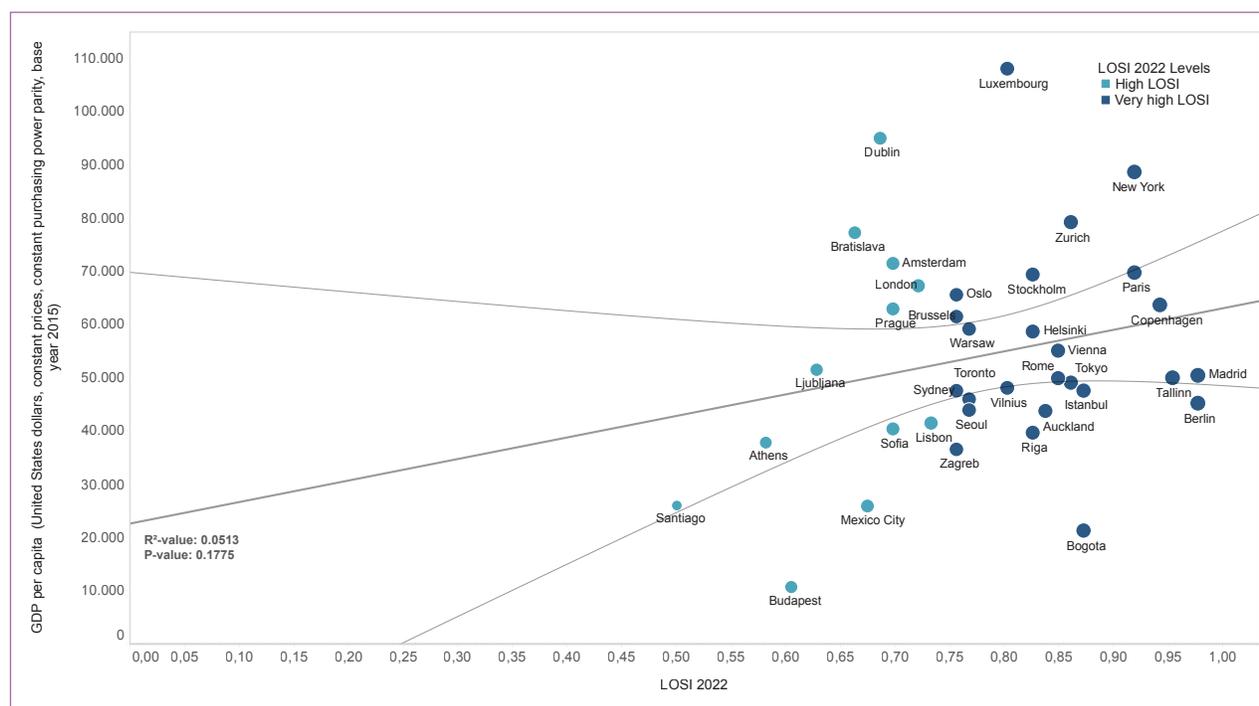
Sustainability issues and the pursuit of a green economy

A number of the cities that responded to the LGQ have launched digital initiatives; some of the primary objectives and specific areas of focus are as follows:

- Promoting the use of safer and cleaner energy for sustainable development (low greenhouse emissions and climate-resilient pathways, electronic emissions testing, power management, optimization of water and energy consumption in municipal buildings, meteorological data provision, air pollution measurement information, residential energy-saving programme);

- Supporting sustainable waste management (smart waste collection);

- Improving urban planning (eco-design of public buildings, green and revitalized cities, new land use modelling, green corridor grid development, and the adoption of Internet of Things (IoT) systems and other emerging technologies for urban farming, smart central markets for fruits and vegetables, digital twin city modelling, bicycle paths);

- Supporting sustainable urban transport (IoT-based traffic management, online traffic control system for public and special transport, e-ticketing system, interactive map allowing real-time public transport tracking, electrical car and motor vehicle plant, adaptive traffic light control system);

- Managing urban safety, security and crises (safety and security, crime control, crisis management, city resilience)

- Addressing educational needs (digitally enhanced education, facilitating educational continuity outside the classroom, strengthening the relationship between parents, children and teachers, supporting distance learning);

- Supporting vulnerable groups (digital tools to improve the quality of life and care for the elderly, digital resources to promote gender equality);

- Initiating and supporting innovation (implementation of innovation centre, online charity services);

- Promoting public engagement (platform for electronic voting on urban development issues).

3.3.4   Usage of online services

This section of the LGQ focuses on the proportion of local e-government services offered online and through dedicated mobile channels and on the collection and publication on usage statistics. Among the cites that responded to the Questionnaire, five reported that they provide 25 to 50 per cent of their services online, seven cities provide 51 to 80 per cent, and eleven cities provide 81 to 100 per cent. A total of five cities provide 15 to 50 per cent of their services through mobile channels, two provide 51 to 80 per cent, and four provide 81 to 100 per cent. The numbers suggest that there is room for growth in mobile services delivery; relatively few of the LGQ respondents are currently providing mobile access to public services, and where such access is available, fewer services are provided. Most municipalities do not offer comparative statistics on the percentage of services provided online or through mobile channels versus the share of services provided through traditional means. It may be assumed that since this information is not included in the LGQ responses, it is not readily available, so cities may need to compile lists of the services they provide and to identify the various channels that can be used to access the sources and keep residents informed.

In Abu Dhabi, the unified TAMM online platform is used for 770 (or 99 per cent) of the 778 digital government services offered within the emirate. The TAMM initiative is designed to ensure that services are easily accessible through a single portal and strategically placed service centres; there are even mobile, drive-through and door-to-door services set up for senior citizens, rural residents, and other vulnerable and underserved populations. The TAMM system is highly efficient; for 519 (93 per

cent) of the government services, transactions can be completed in less than six minutes. In Vienna, around 250 of the 600 services offered by the municipal government can be accessed online through the mein.wien portal, which is designed to offer city residents maximum convenience and speed in their dealings with the authorities. This portal facilitates user interaction; a virtual agent, WienBot, is even available any time of the day or night to answer frequently asked questions.

Beyond moving more services online, governments endeavor to ensure that online services are people-centric, accessible, and user-friendly. The Beijing Municipal Government[13] has made remarkable achievements in this regard: it launched a series of smart and personalized services on its Online Governmental Service Platform, including the Guided Instruction (comprehensive operational manual), 24*7 Real-time Guiding Service, and the Customized User Space built on big data and user portrait, etc. The Guided Instruction provides a clear and concise "operation manual". To ensure that enterprises and people can understand policies and online services, specific guidance is context-interactive in the form of "ask and answer interchangeably". The Real-time Guiding Service creates a people-centric ("warm and kind") "online multi-service window". To ensure that enterprises and people can get clear answers and to avoid any confusion, the Platform provides a real-time support service, supported by an online team of proficient staff. The Unified User Space functions as a personalized, precise and intelligent "virtual assistant". To ensure that enterprises and people can find and access various policies and services, the Platform puts "unified user space" as a central carrier, deploying big data, block chain and other technologies to analyze user needs.

Around 75 per cent of the LGQ respondents report that they collect usage statistics for e-government services, with two thirds of this group sharing relevant results with the public and institutional stakeholders. In Da Nang, a city of 1.1 million residents in Viet Nam, government officials report that more than 180,000 digital personal accounts have been set up on the city's public portal. Zurich affirms that around a quarter of its population is registered on the Mein Konto (My Account) portal.

3.3.5 User satisfaction

Participating municipalities were asked whether they measure the satisfaction of those using e-government services and whether relevant survey results are published online and shared with public institutions.

Some cities administer satisfaction surveys to gather suggestions, feedback and recommendations that can help them improve the quality, accessibility and timeliness of their services and inform future policies and activities. There may be separate sections to allow users to report on specific aspects of their experience and express their level of satisfaction. Some municipal authorities elaborate the findings statistically, using web analytics to measure results relating to, for example, visitors, sessions, page views and time spent. Among the 15 cities that conducted surveys on users' most recent experience with online services provision, five reported satisfaction rates of 65 to 80 per cent, four cities reported rates ranging between 81 and 90 per cent, and six cities claimed that 91 to 100 per cent of the users surveyed were satisfied with their last online public service experience.

Municipalities may publish satisfaction survey results as open data, on social networks, on official government websites, or through traditional media. Some municipalities do not publish the data openly, but they may share the survey results with service providers and developers or with interested government authorities. More than half of the municipalities (55 per cent) confirm that they measure user satisfaction with the e-services they provide. Fewer municipalities (38 per cent) indicate that user satisfaction reports are shared publicly on their portals and social media accounts and with public institutions.

In Bogotá, the district directorate charged with monitoring and improving the quality of public services conducts user satisfaction surveys at on-site points and on the Bogotá te escucha (Bogotá

listens to you) platform, which manages petitions, inquiries and complaints. The city of Asuncion in Paraguay has a website that allows users to share their experience and level of satisfaction with multiple aspects of public services provision. The Seoul Metropolitan Government conducts an annual survey on user satisfaction and releases the results to the public; according to the most recent survey, 23.1 per cent are extremely satisfied, 62.3 per cent are satisfied, 10.3 per cent are dissatisfied, and 2.0 per cent are extremely dissatisfied with online government services provision in the capital city.

3.3.6   Social media

The social media section of the LGQ gathers information on whether and how participating municipalities use social media channels to interact with residents and engage them in e-government activities. Among the cities responding to the Questionnaire, 90 per cent actively use social media platforms for such purposes; this is aligned with LOSI 2022 results indicating that 86 per cent of the cities assessed have a social media presence.

According to the LGQ responses, social media are frequently used to share news and updates relating to local e-government services—though COVID-19 information has been a dominant feature since the pandemic started. Municipalities indicate varying levels of local government activity on different social media networks. Social media accounts are used both to broadcast information and to gather feedback from users. Some cities request that users log in to access the official social media account, while others do not. Local governments frequently use social media to inform the public about meetings and consultations, live-stream press conferences, invite users to public engagements and infrastructure inaugurations, issue public announcements, and answer queries. Residents also use social media pages to express opinions, concerns, complaints and appreciation.

Dedicated social media accounts are often created for specific entities or purposes, including local government departments, projects, initiatives, emergencies or crises. Social media accounts that allow residents to interact with the mayor's office or other high-level authorities can streamline communication and have a meaningful impact. In Bangladesh, Shobar Dhaka (Everyone's Dhaka) is a one-stop digital citizen engagement management platform developed by the Office of the Mayor of the Dhaka North City Corporation. City residents can download this application on virtually any mobile device to communicate directly with the mayor's office or report irregularities within the local government administration, sending messages with images and location information within eight specialized categories. In Muscat, various social media channels are used to raise awareness, share news and information, respond to inquiries and feedback, field suggestions, acknowledge observations, collect data, and promote e-services transformation. Many local authorities have responded to the mobility restrictions surrounding the COVID-19 pandemic by activating social media channels (such as WhatsApp) that have allowed users to submit inquiries about e-services and receive timely responses.

3.3.7   COVID-19 measures

Experience with the COVID-19 pandemic has underlined how important it is for municipal authorities to have the infrastructure and tools in place to provide public support during periods of difficulty and disruption. The present health crisis has exposed the challenges cities face and their vulnerability to crisis situations. Results for the relevant section of the LGQ indicate that all but two of the city portals (95 per cent) have a page or section dedicated to the pandemic and provide relevant information on municipal initiatives for COVID-19 response and recovery. The content includes articles, infographics or a link to the national portal or to a national health agency page for the pandemic, information about COVID-19 testing locations and the availability of health facilities, COVID-19 vaccine information, recent or current statistics (including daily case data and distribution maps), information on policies adopted and measures undertaken to address the crisis (and relevant public recommendations), and information on social assistance for communities affected by the pandemic.

A total of 35 municipalities (83 per cent) indicate that they have implemented digital strategies and solutions for COVID-19 response and recovery and have allocated the necessary budgetary resources to support these initiatives. The following are among the digital solutions adopted and services provided:

- Testing and vaccination appointments;

- Telemedicine services for COVID-19, including a 24-hour call centre with qualified doctors to provide information and assistance;

- GPS-based mobile application to monitor the movement of residents (a system for analysing the movement of residents based on data from mobile operators; facilitating the calculation and monitoring of social isolation indices);

- Targeted social and economic support for residents (providing financial assistance as part of charitable works and social initiatives implemented collaboratively with organizations and institutions; declaring total temporary layoffs; applying for small company grants; approving partial exemption from employer contributions);

- System of e-passes allowing residents to move around the city during the lockdown using individual vehicles or public transport;

- Park walk services (specific time slots assigned for walks in nearby parks; interactive map for parks and public spaces that change colour based on the number of visitors);

- Voluntary check-in system in public places (residents provide phone numbers and receive notifications if any others present in the same place at the same time later test positive for COVID-19);

- QR code system confirming COVID-19 immunity;

- AI algorithm that analyses scans of patients' lungs and uses colour coding to identify areas of concern for medical professionals.

3.3.8   Smart city and new technologies

This section of the LGQ examines strategies and plans for initiatives driven by new technologies such as AI, IoT, blockchain, smart cities, 5G, virtual reality, augmented reality, robotics and 3D printing.

Most of the LGQ respondents (36 municipalities, or 86 per cent) affirm that they have specific strategies in place for the adoption of new technologies. Several municipalities report that designs for smart city initiatives are based on emerging technologies and that development efforts typically involve partnerships with the private sector. Municipalities also coordinate with non-municipal stakeholders to leverage academic research capacities in the development of AI or other emerging technology applications. New technologies are integrated in the following areas:

- Transport monitoring and control, largely based on IoT interconnectivity (license plate recognition; traffic control cameras; traffic light regulation for priority vehicles; air quality sensors; sound and noise-level sensors; sports park and parking lot monitoring and control; real-time information on traffic flows);

- Urban planning (urban observatory centre; real-time control of street lighting; early warning system for floods; operational big data relating to demographics, traffic, air quality, natural phenomena and other key areas collected and analysed via AI and machine learning to provide municipal managers with data-driven insights for decision making);

- Administration (blockchain-based digital identity and digital resident-centric e-services platform; digital land transport services; cloud services for AI development; open data initiatives; AI-driven voice recognition);

- Health care (AI-powered web application helping the health ministry combat the spread of COVID-19);

- Economy (blockchain-based platform for raising venture capital);

- Infrastructure (partnering with broadband companies for 5G commercial network and fiber network development; digital twin technology for operational simulations);

- Environment and weather (sensors measuring temperature, humidity, dust and pollution; green smart offices; IoT-driven solar-powered open areas such as beaches and parks; electric car charging system; IoT-driven collection, distribution and analysis of environmental data);

- Safety, security and crime control;

- Public services and community engagement (using WhatsApp and chatbot application programming interfaces to expand options for e-services provision; m-voting using blockchain; monitoring incident reporting by residents);

- Research and innovation (innovation laboratories).

The LGQ section on big data explores the integration of big data analytics in municipal decision-making processes. When asked whether they plan to use or are presently using big data analytics to guide decision-making, 33 municipalities (79 per cent) responded positively and provided examples. The following illustrates how various city governments use big data for specific purposes:

- Supporting informed decision-making in areas such as tourism, health, anti-corruption, and improving the quality of life for residents;

- Using data to create predictive models for strengthening security (for example, optimizing the placement of city cameras to fight crime);

- Flood management (tracking water levels);

- Vaccination policy prioritization;

- Urban planning and projections (utilizing data on population, households, socio-economic status and other factors to predict and address the needs of city residents);

- Personalizing service provision (assessing resident needs through data consolidation, identifying bottlenecks and operational barriers in providing resident services and improving resident satisfaction);

- Public transportation (identifying optimal bus routes, AI detector placement and video surveillance for traffic);

- Tax policy (using data analysis and AI to determine optimal tax rates for stimulating economic development).

In Kuala Lumpur, the Smart City Strategic Framework is structured around seven outcomes relating to the economy, living conditions, the environment, people, government, mobility, and the digital infrastructure. In Belgrade, the smart city concept encompasses six areas of development: traffic and mobility, public administration, housing, environment, economy, and social and human capital. In Rwanda, different smart city solutions are being piloted and implemented as part of the Smart City Masterplan and are supported by the ICT Sector Strategic Plan. In Monaco, big data analytics are currently being used to inform the smart city strategy; an urban hyper vision system contributes to the optimal monitoring and management of all major urban municipal functions, and an urban digital twin (a virtual 3D digital representation of the Principality) allows the municipality to collect and aggregate urban data that can then be used to make smarter decisions. In concrete terms, these data can be used, for example, to carry out simulations and produce forecasts of the impact of urban works on traffic and to take steps to minimize this impact. Almaty also reports increased reliance on big data analytics for municipal development; local authorities have used the information obtained to set up Sergek, a video surveillance system for traffic management and, working together with the International Finance Corporation (IFC) and Habidatum, have captured and analysed GPS data

for Almaty to upgrade the cycling infrastructure. It is worth mentioning that all data and analyses are published and available to the public in Almaty; the information provided can help businesses identify potential growth opportunities and be used in academia for scientific purposes.

3.4   Partnerships and application of LOSI methodology in countries

Technology and municipal e-government development in global forums

The integration of technology in city development and administration has received priority attention in many international forums. Particular attention has been given to locally driven needs assessments and development efforts that reflect an understanding of and direct experience with the dynamics in a particular area. Global forums offer a space in which successful local initiatives can be shared and where countries in the early stages of e-government development can gather information and receive assistance. The biennial World Urban Forum serves as a platform for the sharing of best practices and innovation; in documentation prepared for the eleventh session of the Forum (to be held in June 2022), it is noted that putting people at the centre of local digitalization efforts can stimulate the development of homegrown innovation systems that generate contextual solutions in urban areas. For the past three years, each G20 Presidency has promoted the integration of technology at the city level. In 2019, the G20 Presidency of Japan launched the Global Smart Cities Alliance to highlight the importance of open, interoperable, standards-based digital urban platforms. In 2020, Saudi Arabia further encouraged the advancement and wider adoption of smart cities and communities. In 2021, the Presidency of Italy produced the *G20 Report on Practices of Innovative Public Procurement for Smart Cities and Communities*, a shared tool that can be used by government authorities at all levels to inform the development and implementation of smart city initiatives. To facilitate progress towards the SDGs, in particular Goal 11, several forums have addressed sustainable urban planning and the pursuit of a more sustainable future, focusing on a number of different areas. The 2021-2022 International Mayors Forum, hosted by UN DESA and the United Nations Office for Sustainable Development together with the United Nations Centre for Regional Development (UNCRD), aimed at providing a knowledge-sharing platform to help cities initiate smart transformations towards more sustainable, resilient, safe and inclusive societies, with particular emphasis on addressing pandemic-related challenges. The second Forum for Mayors, held in April 2022, focused on exchanging urban development solutions around climate-neutral housing, green cities, and sustainable urban transport. The C40 World Mayors Summit in 2019 launched the Global Green New Deal, with mayors from nearly 100 major cities making new commitments to achieve 2030 targets for sustainable, healthy food systems and clean air. In *Our Common Agenda*, the Secretary-General states that the United Nations system will strengthen its collaboration with subnational authorities through the creation of an Advisory Group on Local and Regional Governments.

Other partnerships

The cities responding to the LGQ highlight other types of partnership arrangements. Some cities cooperate with sister cities through mechanisms such as twinning agreements or with partner cities based on contractual or informal arrangements. Some use interactive platforms that allow municipal authorities to build relationships with residents and bring them in as equal partners in discussions and decisions relating to local priorities or activities such as environmental and social assessments for urban planning, smart city concepts, and improving the quality of life. City authorities also collaborate with the private sector (including industries) and academia to share knowledge, promote innovation, and facilitate e-government and smart city development.

A number of cities are actively engaged in networking, forging connections that allow them to exchange ideas, strategies and resources with other cities and development partners. Some promote dialogue between their CIOs and representatives of cities that are leaders in digital government and smart city development. Many cities are members of national or international organizations

such as Eurocities, the Polis network, European Mozart Ways, the League of Historical Cities, the Organization of World Heritage Cities, the Council of Global City CIOs, Green Legacy, the ASEAN Smart Cities Network, Innovative Governance of Large Urban Systems, the Spanish Federation of Municipalities and Provinces, the Ibero-American Organization for Intermunicipal Cooperation, the C40 Cities Climate Leadership Group, Madrid Futuro, and the Cities Coalition for Digital Rights. Cities also collaborate with local and international entities (including governmental, non-governmental and non-profit agencies) in formulating and implementing municipal development initiatives. Such partners may offer expertise in a specialized area (such as migration) or share development priorities with a city or group of cities; some of those mentioned in the LGQ include Deutsche Gesellschaft für Internationale Zusammenarbeit, British Embassy Jakarta, and OCTA Research.

LOSI network

Owing to resource limitations, UN DESA was able to include only the most populous cities in the 193 Member States to participate in the 2022 LOSI survey and related activities. These cities were selected to cover as many residents as possible. However, there was strong interest in applying the LOSI methodology to assess e-government in more cities in individual countries, and UN DESA was able to sign memorandums of understanding and partner with various institutions to run LOSI pilots in multiple cities within selected countries. At the time of writing, pilot studies have been carried out in Brazil, Jordan and the State of Palestine; the findings are available at https://publicadministration. un.org/egovkb/en-us/About/LOSI-PILOTS.

Independent studies have been undertaken by academics in China and Ecuador using the LOSI methodology elaborated in previous editions of the *United Nations E-Government Survey*. It is expected that a growing number of cities will utilize the LOSI methodology, become part of the LOSI network, and help other cities that may be experiencing similar challenges in e-government development. UN DESA welcomes opportunities for collaboration in applying the LOSI methodology in different countries; interested parties are encouraged to contact the Division for Public Institutions and Digital Government at dpidg@un.org.

3.5   Conclusion

- In 2022, as in 2020, the LOSI findings indicate that city portals do not perform as well as their national counterparts. Continued monitoring and assessment of local and national e-government development is essential to close the gaps and to support public sector digitalization at all levels.

- The average LOSI value increased from 0.43 to 0.51 between 2020 and 2022. While the halfway point has been surpassed by the surveyed group as a whole in terms of meeting development indicators, there remains much room for growth.

- The more populous cities tend to have a higher overall LOSI value. This is an important finding given the increasing rate of urbanization worldwide. The correlation between population size and LOSI level may be linked to the greater access of the more populous cities to important resources such as a highly skilled workforce, a broad knowledge and skill base, and a large public budget.

- Among the five criteria assessed for the 2022 LOSI, the institutional framework subgroup reflects the highest level of compliance, with 47 per cent of the city portals meeting 75 to 100 per cent of the indicators listed. Content provision is ranked second, with 40 per cent of the portals assessed satisfying 75 to 100 per cent of the indicators.

- As was the case in 2020, the lowest rate of compliance is in services provision, with only 12 per cent of the city portals implementing 75 to 100 per cent of the indicators.

- Most city portals have a dedicated COVID-19 page or section serving as a hub for pandemic-related information, contributing to recovery efforts. Many cities have formulated specific strategies and implemented targeted digital technology solutions for COVID-19 response and recovery.

- New technologies are integrated in the e-government development strategies and activities of various cities. Many of the advanced technology applications are being used to support evidence-based decision-making.

- Local governments must consider the opinions of residents, taking into account the needs and preferences not only in services provision but also in decision-making processes.

- A properly formulated local e-government strategy can facilitate the consolidation of a sustainable local administration model with the SDGs as its fundamental pillars.

- It is essential to support the development of cities worldwide. Pilot initiatives have been carried out in a limited number of smaller cities, but much broader LOSI coverage would allow needs to be identified and targeted solutions developed in line with local priorities and budgets. The more populous cities often have more resources and can develop advanced portals and smart city applications, but smaller-scale solutions are needed for other cities. Collaboration between cities of similar size and with similar needs would be very beneficial. The LOSI network can support these efforts and others aimed at strengthening e-government at the level closest to the population it serves.

Endnotes

[1] United Nations, Our Common Agenda: Report of the Secretary-General (Sales No. E.21.I.8), para. 119, available at https://www.un.org/en/content/common-agenda-report/assets/pdf/Common_Agenda_Report_English.pdf.

[2] United Cities and Local Governments, "The Sustainable Development Goals: what local governments need to know", United Cities and Local Government, available at https://www.uclg.org/sites/default/files/the_sdgs_what_localgov_need_to_know_0.pdf.

[3] United Nations, World Urbanization Prospects: The 2018 Revision (Sales No. E.19.XIII.7), available at https://population.un.org/wup/Publications/.

[4] Ibid.

[5] International Telecommunication Union, Measuring Digital Development: Facts and Figures 2021 (Geneva, 2021), available at https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2021.pdf.

[6] Richard Heeks, "Benchmarking eGovernment: improving the national and international measurement, evaluation and comparison of eGovernment", iGovernment Working Paper No. 18 (2006), p. 257, available at http://dx.doi.org/10.2139/ssrn.3540043; Demetrios Sarantis, "Removing barriers in e-government: back office assessment", in Proceedings of the International Conferences on WWW/Internet 2017 and Applied Computing 2017, Pedro Isaías and Hans Weghorn, eds.

[7] UN-Habitat, World Cities Report 2020: The Value of Sustainable Urbanization (Sales No. E.21.III.Q.1), p. 3, available at https://unhabitat.org/sites/default/files/2020/10/wcr_2020_report.pdf.

[8] United Nations, 2019 Demographic Yearbook, seventieth issue (Sales No. B.20.XIII.22), available at https://unstats.un.org/unsd/demographic-social/products/dyb/dybsets/2019.pdf.

[9] United Nations, "The world's cities in 2018: data booklet" (ST/ESA/ SER.A/417), available at https://www.un.org/development/desa/pd/content/worlds-cities-2018-data-booklet.

[10] Iceland, City of Reykjavík, Frístundakaortið [Leisure Card], available at https://reykjavik.is/fristundakortid.

[11] Abu Dhabi Government Procurement Gate, available at https://adgpg.gov.ae/.

[12] Bogotá Smart Territory Plan 2020-2024, summary document (V.1.0-August 2021), p. 3.

[13] https://banshi.beijing.gov.cn/

4. Leaving no one behind in the hybrid digital society

4.1 Introduction

The principle of leaving no one behind has its origins in the Latin phrase *nemo resideo*, used in warfare to manifest the dependence of people's lives on their ability to function as a single entity—which meant never abandoning anyone injured or incapacitated on the battlefield. This military ethic has since influenced other fields of endeavour. It is no coincidence that the principle of leaving no one behind has emerged as the central axis of the 2030 Agenda for Sustainable Development, cutting across its 17 Sustainable Development Goals (SDGs). The common vision shared by all countries and stakeholders is that sustainable development is for all and that the Goals, indicators and targets will not be considered fulfilled unless they are met for every person on Earth. Sustainable development is therefore not possible if vulnerable segments of society are excluded and left behind.

While the principle of Goals being met only if they are met for everyone is well established in the rhetoric surrounding the SDGs, the reality remains far removed from the ideal, and what leaving no one behind means in practice is still unclear. The world continues to wrestle with translating the pledge of leaving no one behind into pragmatic policies and actions on the ground. An important first step is identifying gaps and areas of need. In the context of the present report, this means exploring the disconnect within the digital government ecosystem — the fact that most of the gains and advancements in e-government target and benefit the higher-income, more literate, and other advantaged segments of society, while efforts to meaningfully serve the lower-income and more vulnerable populations are often limited or futile.

4.1.1 Leaving no one behind is one of the 11 principles of effective governance for sustainable development

Leaving no one behind in the evolving hybrid digital society is a challenge for both developed and developing countries. Although social equity is a considered a priority among public administrators, challenges often arise in finding a balance between social equity, economy and efficiency.[1] For instance, the development objective behind the establishment of a personal identification system is inclusive in nature, but in cases where the approach is not well designed or where the legal framework is weak and fails to take into account factors such as cost and access, discriminatory practices can emerge that will have the greatest impact on the most vulnerable, including those living in poverty, women, older people, and persons with disabilities. Box 4.1 illustrates "leaving no one behind" as one of the 11 principles of effective governance for sustainable development, as endorsed by the United Nations Economic and Social Council.

Photo credit: pixabay.com

Chapter 4

4.1.2   The new face of inequality is digital

Millions of connected individuals can leapfrog traditional barriers to enjoy the services and benefits of a digital government and economy, with faster communication, streamlined transactions and a multitude of services at their fingertips. Digital technology is playing an increasingly critical role in the way the world lives, learns, works, and participates in the economy and society — which means that vulnerable populations without digital access are effectively placed at an even greater disadvantage and are being left even further behind. To achieve equitable participation in the digital society and bridge the widening digital divide, Governments must make meaningful digital opportunities available for all – beyond basic connectivity, in particular the poorest members of society, women and girls, older people, persons with disabilities, youth, migrants, refugees, and other marginalized groups.

During the COVID-19 pandemic, the world has witnessed an unprecedented, accelerated digital transformation that, while enormously beneficial in many respects, has prompted the emergence or exacerbation of various forms of digital inequality. The pandemic has provided the opportunity for countries to demonstrate how e-government can help fight the spread of the virus, sustain daily life, support business continuity and keep people socially connected,[3] but it has also shown that those who are excluded from the digital transformation are at increased risk of being permanently left behind in all countries, whether rich or poor. In many ways, digital access, affordability and ability are now collectively the primary determinants of digital divides or "digital poverty", which can be viewed as another dimension of multidimensional poverty.[4] Those without digital connectivity have reduced access to the public services and economic opportunities that are increasingly moving online. The divides between the digitally connected and digitally disconnected continue to widen. The pandemic has deepened socioeconomic and digital disparities, reinforcing the vicious cycle of inequality, including intergenerational inequity especially of older people.

During the pandemic, countries more advanced in e-government development have fared better than countries lagging behind in their digital government development[5]. As public services and systems rely increasingly on digital connectivity, those countries and communities lacking the necessary digital access, tools or skills will find it progressively more difficult to take advantage of the benefits and opportunities the digital society offers.

The new face of inequality is digital – a fundamentally important, additional facet in connection to underlying existing socio-economic inequalities. The digital divide is now characterized by a higher degree of complexity; it is no longer just about connectivity but is also a measure of the extent to which one can benefit from online information and digital services. In the hybrid digital society that exists today, the lack of access to digital services among those who are living in poverty or vulnerable situations—referred to in this chapter as the digital poor—may be either intentional (the result of exclusionary policies and laws) or unintentional (the result of societal power dynamics or one-size-fits-all policies).[6] The digital gaps in institutional coverage can also be attributed to a lack of access to engagement opportunities and consultative processes for vulnerable populations, coupled with a lack of awareness about the needs of these groups on the part of Governments.[7] Achieving digital equity for all is more urgent now than ever before.

4.1.3   The double-edged sword of e-government in leaving no one behind

Remarkable progress has been achieved in e-government development over the past two decades, as reflected in the steadily rising E-Government Development Index (EGDI) values during this period;[8] however, certain segments of the population have not been able to take full advantage of the advances made. Gender, age, income, race, ethnicity, language and geographical locations (rural/urban) are among the factors that lead to systemic exclusion that can in turn jeopardize the realization of e-government for all. Those benefiting most from what e-government has to offer are digitally connected young urban males in the upper-middle-income bracket, while those benefiting least are vulnerable and marginalized populations.

There are, however, some positive trends in digital and e-government development that are facilitating efforts to leave no one behind. E-services delivery to vulnerable populations is improving because the production, collection, storage, analysis and dissemination of data are easier and cheaper, new digital devices are more affordable and easier to access, and mobile cellular and mobile broadband coverage and subscription costs have improved. There are many opportunities to enhance social services support and digital inclusion through e-government; digital social cash transfers are but one example. The real opportunity for digital government to deliver the SDGs lies in offering affordable services tailored to the needs of vulnerable segments of the population. According to an assessment that measures the extent to which national systems, institutions and practices across countries are set up and are ready to meet commitments enshrined in the 2030 Agenda for Sustainable Development, in 2020, only 75 countries are ready to meet their commitment to leaving no one behind.[9] Figure 4.1 illustrates the clear correlation between higher EGDI and E-Participation Index (EPI) values and better performance in the LNOB index.

Acknowledging the complexity of leaving no one behind as a multidisciplinary concept with important policy implications for development and e-governance, the present chapter strives to offer a cross-cutting definitional framework that establishes this concept as the undergirding basis for inclusive e-government. In this chapter, leaving no one behind largely centres around leaving no one offline. The chapter has thus far explored some of the realities surrounding digital exclusion; the remaining sections identify which groups are most affected, explore barriers relating to access, affordability and ability – and the intersectionality of these barriers and propose an integrated framework for leaving no one behind that is grounded in data, design and delivery optimization. (See Figure 4.2) The chapter concludes with a set of policy messages. Sources for the information presented include both primary and secondary data. Primary sources include EGDI Online Services Index (OSI) data from 193 United Nations Member States, completed Member States Questionnaires (MSQs) from 129 countries (based on a call for submission), and a related review of national e-government portals.[10] Secondary sources include both desk research and qualitative/interpretive research.

Figure 4.1   Positive correlation between the leave no one behind indices, E-Government Development Index and E-Participation Index
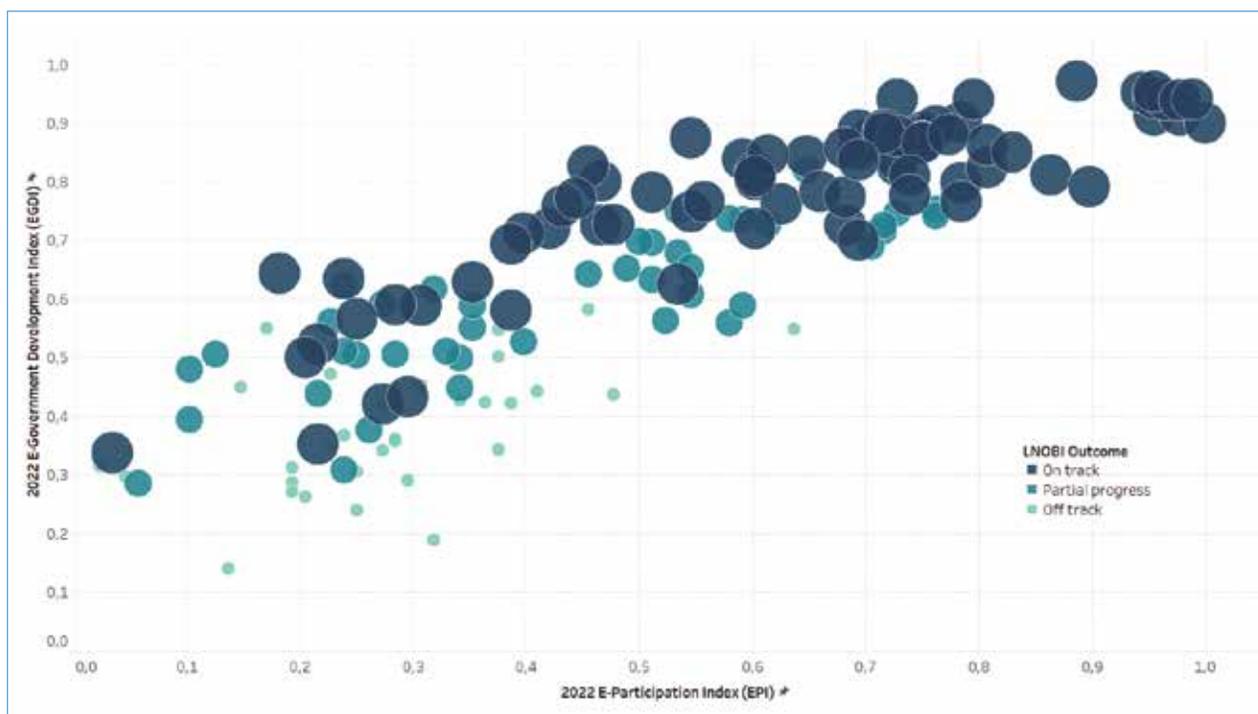
Note: The 'leave no one behind' (LNOB) indices is developed by the Overseas Development Institute (ODI).

Figure 4.2   An integrated framework for e-government: strengthening data, design and delivery (enablers) to address barriers relating to access, affordability and ability
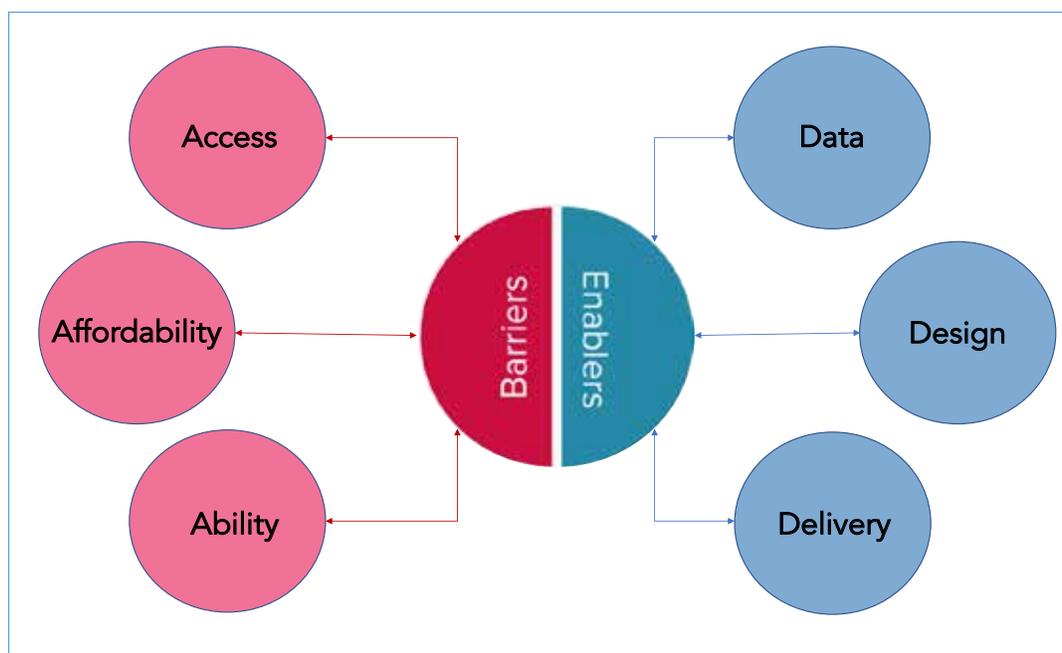
4.2   Identifying those being left behind in e-government

In the context of e-government, a vulnerable or disadvantaged person may be broadly defined as one who is unable or at risk of being unable to access the online information or e-service(s) he or she requires, or for whom such access requires a disproportionate level of effort, with this lack of access placing that individual at a disadvantage.[11] The marginalization of certain segments of society may be intentional or unintentional, and very often, intersectionality adds another layer of complexity. Being left behind might result from high connectivity costs or the inability to access services or participate in consultative processes. Vulnerable populations may be overlooked when countries engaged in e-government development adopt a one-size-fits-all approach (such as a digital-by-default policy) or fail to consider societal power dynamics. Socioeconomically disadvantaged individuals and groups are most susceptible to digital exclusion. In some cases, such exclusion may be deliberate in the sense that it results from discrimination, injustice, the denial of services, the absence of legal status (including the lack of a digital identity), or exclusionary policies.

Every individual — regardless of age, race, gender, ethnicity, legal status, place of residence, or socioeconomic status — is entitled to basic rights and services, including e-government services. The digital divide reflects and exacerbates longstanding structural inequalities, so while vulnerable populations may stand to benefit most from digital and learning technologies, they are also the most likely to be digitally excluded. Public institutions can play a key role in identifying those who are marginalized or disadvantaged and in ensuring that policies, funding and resources are directed towards addressing any gaps identified.

In this chapter, the "digital poor" are identified as those who are left behind because they possess certain inherent or perceived characteristics or are in situations that effectively prevent them from accessing the digital opportunities enjoyed by others. The subsections below identify specific groups among the digital poor that have been left behind in e-government, not to mention the ingrained intersectionality.

4.2.1   Those living near or below the poverty line

Poverty is multidimensional and takes many forms but is almost always associated with a lack of access to basic public services; digital poverty is an added dimension that can leave already disadvantaged groups even further behind. With the integration of digital poverty into the poverty paradigm, the implications of poverty extend beyond income measurements and the lack of access to health, education, housing, social security and other services to include the lack of integration in the digital world. Public administrations need to ensure that social protection, healthcare, education, employment, water and sanitation services are of adequate quality and are available, accessible and culturally acceptable to all groups in society—and as many of these services move online, extra steps need to be taken to ensure that those living in poverty are able to access essential e-services.[12,13]

Both within and between countries, lower income usually correlates with a lower rate of Internet penetration and e-government implementation.[14] Even if economically disadvantaged populations are able to gain digital access, relatively few countries are offering the services they need online. Only 48 countries (24.9 per cent) allow people to apply or file for unemployment benefits online, and only 58 countries (30.1 per cent) provide a digital option for those needing to apply for social protection programmes such as maternity care, child subsidies, pensions, housing or food allowances (see table 4.1).

Poverty may also be associated with factors or conditions that can lead to discrimination or deepen disadvantage, such as being a woman with a disability.[15] The barriers preventing vulnerable populations from accessing microcredit or obtaining employment can contribute to the perpetuation of a vicious intergenerational cycle of poverty that is difficult to escape. (See Box 4.2) The individuals

Table 4.1   Inadequacy of online access to unemployment benefits and social protection programmes

	Number of countries	Percentage
Users can apply or file for unemployment benefits (transactional services) online.	48	24.9
Users can apply online for social protection programmes such as maternity care, child subsidies, pensions, housing, and food allowances.	58	30.1

Box 4.2   Financial inclusion in Bangladesh: Making Digital Financial Services Work for the Poor

Bangladesh has shown tremendous growth in terms of digital financial account access through the proliferation of branchless banking, which has taken full-service retail banking to the doorsteps of rural citizens across the country, and soaring mobile financial services (MFS), which have reached a client base of over 100 million. Combining these channels, and in collaboration with the Ministries of Social Welfare, Finance, and Bangladesh Bank, the a2i Programme of the Government of Bangladesh, with support from UNDP, the Gates Foundation and the Consultative Group to Assist the Poor, developed the 'Citizen's Choice Architecture' for digital payments of social safety net programs – such as elderly allowance, allowance for widowed, deserted, and destitute women, allowance for financially-insolvent disabled people. Guided by the 'AIM Principle' (Account + Identity = Mobility), it allows for the disbursement of allowances at accessible cash-out points at the union level (the lowest administrative tier comprising 9 villages), or even at the homes of the elderly or persons with disability. Over 12 million citizen-beneficiaries can now simply walk a short distance to the nearest Digital Centre or agent banking booth and using biometrics under the supervision of the local entrepreneur or, business correspondent appointed by an agent bank, cash out their allowance from their own full-service bank account that is tied to their unique national ID number. The whole technology setup requires only an active mobile data connection in order to function.

Source: https://a2i.gov.bd/digital-financial-services/; https://www.cgap.org/blog/bangladeshs-covid-19-response-taking-digital-finance-new-levels

and populations affected have little or no voice in policy design, formulation and implementation. People may remain poor not only because they lack economic means, but also because they have little or no opportunity to participate in society and are excluded from decision-making.[16]

4.2.2   Women and girls

Gender equality is one of the cornerstones of sustainable development, and public institutions have an important role to play in bridging the gender gap so that no one is left behind. In 2020, global averages for Internet use were 62 per cent for all men and 57 per cent for all women, irrespective of age, income or geography;[17] the corresponding proportions were 31 and 19 per cent for least developed countries (LDCs), 38 and 27 per cent for landlocked developing countries (LLDCs), 35 and 24 per cent for Africa, and 68 and 58 per cent for the Arab States. The gender gap is evident across all sectoral services, with one research study concluding that women are 30 to 50 per cent less likely than men to use the Internet to participate in public life.[18] Women are also less likely to own a smartphone, and even where the gender ratio in Internet use is nearly equal, other inequalities reduce the likelihood of women having higher-quality means to ensure meaningful connectivity.[19,20] As seen figure 4.3, there is an inverse relationship between the EGDI and the Gender Inequality Index[21] (GII), indicating that there is more gender inequality in countries with low EGDI values. There are also relatively few countries offering online services that may be of particular benefit to women.

Figure 4.3   Inverse relationship between E-Government Development Index and Gender Inequality Index
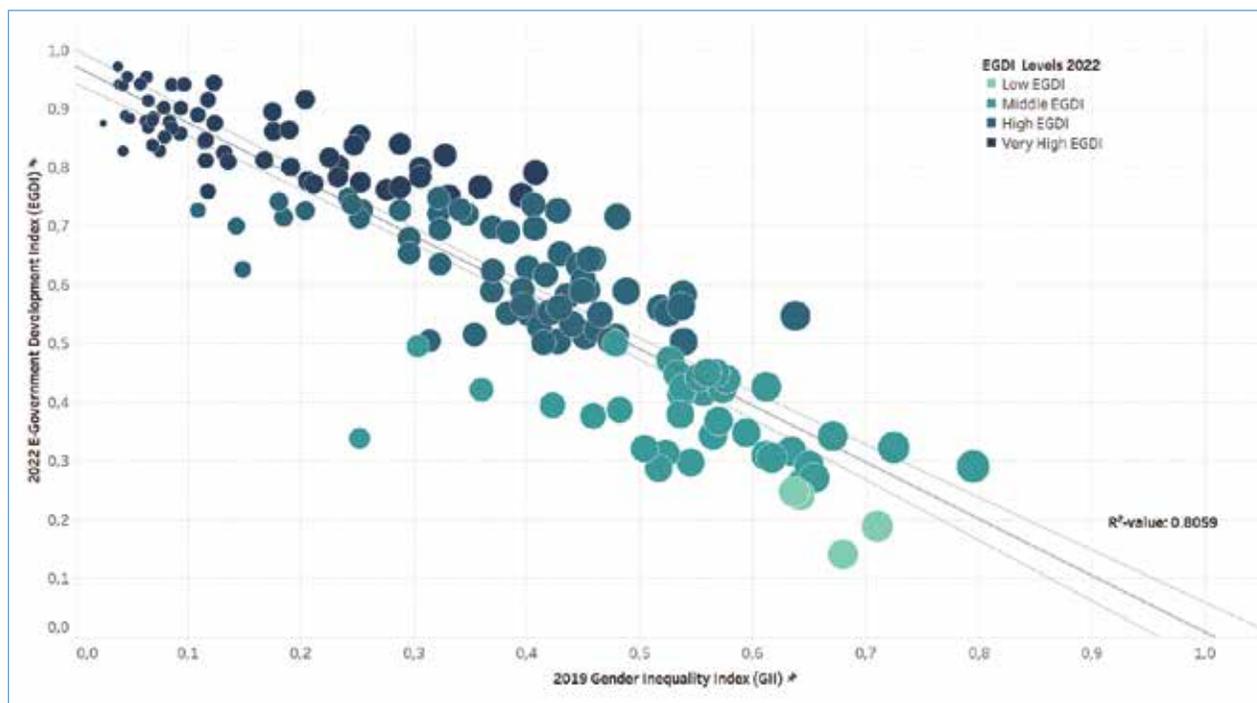
For example, according to the 2022 Survey results, only 43 countries allow users to apply online for child benefits, and only 45 countries allow users to apply online for maternal or newborn benefits.

In addition to being less connected, women are underrepresented online and in data. Relatively few countries collect gender-disaggregated user data; as show in figure 4.4, the proportion of countries that gather such data is highest in the Americas (47 per cent), followed by Asia (35 per cent), Europe

Figure 4.4   Proportion of countries collecting gender-disaggregated user data, by region

119
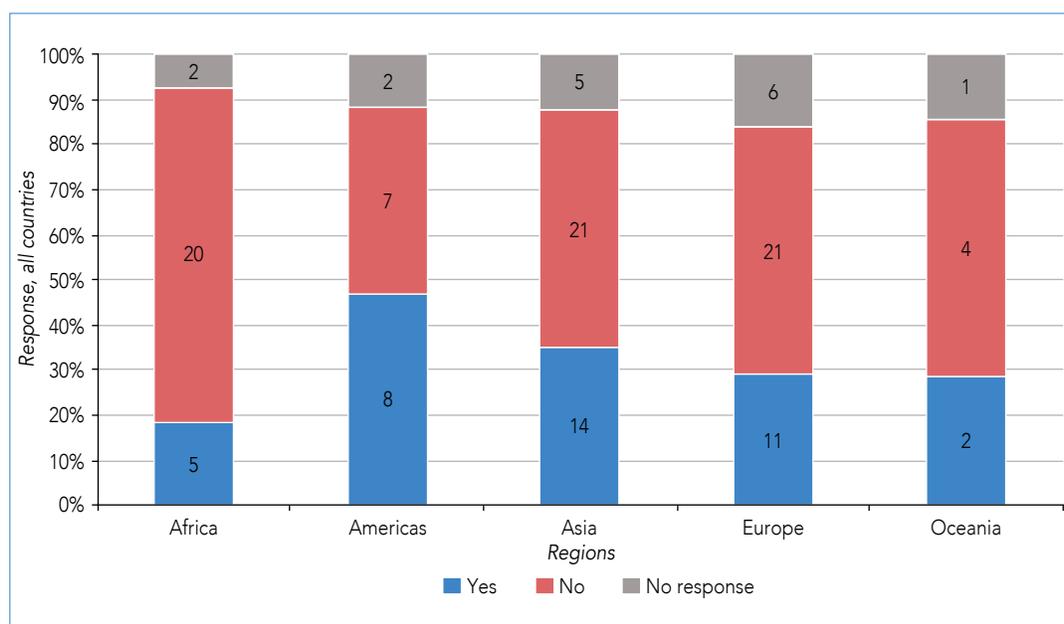
and Oceania (29 per cent), and Africa (19 per cent).[22] Only 9 per cent of LLDCs, 16 per cent of LDCs, and 12 per cent of small island developing States (SIDS) collect gender-disaggregated user data. Additionally, fewer women than men use social media or other online platforms. This has first-order implications for online representation, access, perspectives and knowledge creation, but there are also second-order implications in terms of the data sets created, the algorithms developed, and the machine learning that takes place in the digital transformation of the public sector, such as the unintentional exclusion of certain vulnerable groups in service delivery.

Gender disparities at the top level of e-government leadership are significant. Among the 111 countries with chief information officers (CIOs) or the equivalent,[23] female CIOs account for only 11 per cent of the total. In terms of regional distribution, there are four female CIOs in the Americas (Belize, Cuba, Peru and Bolivarian Republic of Venezuela), four in Europe (Denmark, Montenegro, Portugal and Sweden) and three in Asia (Brunei Darussalam, Myanmar and Qatar); there is only one female CIO in Africa (Rwanda) and none in Oceania (see figure 4.5).

Figure 4.5   **Gender disparities at the top level of leadership in e-government (chief information officer or the equivalent)**
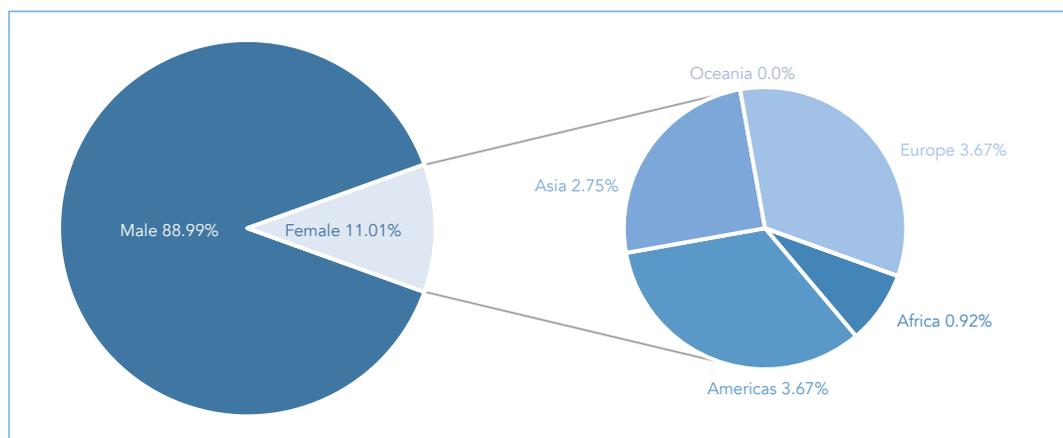
4.2.3   Older persons

The hybrid digital society is also an ageing society. Presently, around 10 per cent of the global population is at least 60 years of age, but this share is set to increase to about 20 per cent by 2050, equalling more than 2 billion people. Worldwide, the 60-79 and 80-plus age groups are experiencing the most rapid growth, especially in middle-income and high-income countries. While the global population is growing at around 1 per cent per year, the number of people over 80 years of age is increasing at 4 per cent annually, and it is predicted that by 2050, people over the age of 60 will outnumber children aged 14 years and under.[24] The growth in the share of older people is the result of declining fertility and increasing longevity as well as advances in social and economic development. This demographic transition is taking place against the backdrop of the accelerating digital transformation. In most countries, the elderly represent the largest group of individuals that do not use information and communications technology (ICT).

Assistive technology devices and solutions can support greater and safer mobility for older people, especially persons with disabilities or those living alone. Social media platforms can promote social interaction and reduce social isolation and loneliness. While there is a cohort of older persons who are gaining more experience and confidence using online services and choosing to adopt assistive technology solutions to improve the quality of their daily lives, especially among those in higher-

income groups,[25] there are al older adults who are being left behind. The COVID-19 pandemic has exacerbated the suffering of seniors in vulnerable situations and has demonstrated the fragility of the digital progress made by this cohort or the lack thereof. The risks and vulnerabilities faced by older persons are shared across the world; for instance, in many countries older individuals lack access to social protections such as universal health care and pensions. According to the 2022 Survey, 109 countries (56.4 per cent) provide online information on how older persons can apply for long-term care (see table 4.2).

Table 4.2   Availability of online information relating to long-term care for older persons

	Number of countries	Percentage
Online information on how older persons can apply for long-term care (including support enabling them to receive home-based care or secure a place in retirement housing facilities)	109	56.4

The 2022 Fourth Review and Appraisal of the Madrid International Plan of Action on Ageing (a) emphasizes that ageing technology—which is technology specifically designed to provide services to the growing number of older people and ensure that they stay connected, active and cared for—can reduce health risks and promote cost-effective access to health care for older people and (b) calls upon Governments to develop policies and action plans to achieve digital equity for all ages. In formulating these policies, it is particularly important to promote digital literacy and narrow the digital-skills gaps of older people through tailored peer-to-peer or intergenerational training programmes. In the fast-changing digital environment, developing, strengthening and maintaining digital literacy requires a life-course approach. While older people are among the least digitally connected population groups, they are also among the most vulnerable to cyberthreats such as cyberfraud, so it is also critical to establish adequate safety measures, raise awareness, and teach older users to be cautious online.

There is growing evidence that technological support can bring about significant benefits for older people while at the same time improving the cost-effectiveness of health and social services.[26] Research suggests that the use of innovative technologies may constitute a cost-effective approach to enhancing healthy ageing by enabling ageing-in-place, self-care and self-management, facilitating cognitive stimulation and social interaction, and improving the efficiency of and access to health and social services.[27] Seamless, easy-to-use e-government solutions, combined with face-to-face communication, define the future of digital inclusion for seniors. Building an agile plan directed at both digital seniors and elderly novices will enhance returns on investment, for instance, through blended/omnichannel delivery (Refer to later section 4.4.3 on Delivery).

4.2.4   Persons with disabilities

More than 1.3 billion people, or 15 per cent of the world's population, experience some form of disability, with a large number living in developing countries. It is important to recognise the diversity of disability as disability extends across a wide spectrum, involving various levels of ability and encompassing physical and mental limitations. Similar to older people, they tend to struggle with the adoption of digital technologies. Though they make up a relatively smaller share of the population, they should not be overlooked.

In many countries, essential services for persons with disabilities are poor or unavailable. It must be emphasized that there is nuanced diversity faced by different groups of persons with disabilities. Individuals with disabilities face exclusion at multiple levels: they must deal with negative attitudes, stigma and discrimination; they have little or no access to enabling physical and virtual environments, assistive technologies, and rehabilitation opportunities; and there are generally few societal mechanisms in place to promote independent living. Data show that, on average, poverty rates are 15 percentage points higher for persons with disabilities than for those without.[28]

In article 9 of the United Nations Convention on the Rights of Persons with Disabilities, States Parties are called upon to "promote access for persons with disabilities to new information and communications technologies and systems, including the Internet". The Convention has been in place for well over a decade, but relatively little headway has been made in creating an environment in which persons with disabilities are digitally connected, especially in developing countries. Article 9 of the Convention focuses on accessibility, mandating that countries take appropriate measures to ensure accessibility within both the physical and the virtual environment. Some Governments have responded by formulating policies, laws and guidelines to ensure digital accessibility; for example, New Zealand has focused on making websites more accessible, and Japan and the Republic of Korea have concentrated on the accessibility of mobile applications. In many countries, compliance is mandatory only for public sector institutions, but in India and the Republic of Korea, private sector organizations are also expected to ensure that their products and services are accessible to persons with disabilities.[29]

In 2019, Secretary-General António Guterres launched the United Nations Disability Inclusion Strategy, noting that "when we remove policies or biases or obstacles to opportunity for persons with disabilities, the whole world benefits".[30] There are evolving technology solutions that can benefit both persons with disabilities and the general community. Speech recognition systems were originally designed for people with limited hand movement, and the scanner was designed as part of a document-reading device coupled with speech synthesis for blind people; both are now mass-market products. Assistive technologies can help those with certain disabilities access e-services more effectively (see subsection 4.4.2).

At present, e-government is far from being accessible for all persons with disabilities. Many of those with disabilities lack access to both physical services and e-services. Access to online services confers a disproportionate advantage, while the lack of access constitutes a disproportionate disadvantage. It often takes more effort and/or costs more for persons with disabilities to use e-government services and engage in e-participation activities. A small number of targeted e-services are currently available in some countries; according the 2022 Survey, 95 countries (49.2 per cent) allow eligible persons to apply online for disability compensation benefits.

Technical standards for e-services can be developed to meet a particular disability need, but it is just as important to consider the potential disability-related impact at all stages in the development of general technical standards. Creating accessibility guidelines and consulting with disability experts are two ways to raise awareness among countries establishing e-services and relevant standards. In low-income communities with limited infrastructure and no previous experience with targeted assistance, those with disabilities can become increasingly isolated from the rest of society, but the provision of inclusive e-services can help close the gap. For persons with disabilities, accessibility and inclusion should be assigned top priority in the actions and policies of public institutions.

4.2.5   Youth

Globally, there are more than 1.8 billion young people between the ages of 15 and 24, and close to 90 per cent of them live in developing countries. Young people have never been more educated or more connected, yet they continue to encounter significant obstacles that prevent them from realizing their full potential. Around 267 million youth are not in education, employment or training; young women make up two thirds of this group as a result of gendered expectations guiding them towards unpaid family work and informal employment.

Technology has greatly expanded access to information and opportunities, prompting changes that have transformed the lives of many young people. The innovative potential of young people and the power of technology are already proving to be a powerful combination for empowering youth to achieve the Sustainable Development Goals. Young people around the globe are generally eager to adopt new technologies and should face no difficulties in embracing digital government.

As elucidated in *Our Common Agenda*, "[one] priority identified by youth is the availability and sustainability of decent jobs and economic opportunities. The COVID-19 pandemic has had a serious impact on young workers and those transitioning to employment, particularly young women. Too many are settling for work in the informal sector or jobs for which they are overqualified and underpaid, neither meeting their aspirations nor allowing them to unleash their full potential, and perpetuating underdevelopment and lack of tax revenue in low- and lower-middle-income countries."[31] The intersection of e-services and youth employment will allow young people to play a part in the achievement of the SDGs. When optimized, digital government can actively contribute to the creation of new jobs, the economic empowerment of vulnerable groups, the promotion of better health systems, and improved access to inclusive and equitable quality education. According the 2022 Survey, 128 countries (66.3 per cent) provide links and references to employment for youth in their national portals.

Digital government can also play a central role in engaging young people in public discourse. Some government administrations have addressed the limited participation of youth in policymaking through targeted policy and institutional reform; the adoption of relevant legislation and the creation of a national youth congress are among the mechanisms implemented to facilitate youth participation in governance. Enhanced responsiveness to the needs of youth in the development and delivery of public services has stimulated an increase in proposals put forward by young people as inputs to policymaking.

4.2.6 Migrants and refugees

As noted in the *United Nations World Public Sector Report 2018*, delivering public services to migrants and refugees can be challenging.[32] There are disparities within and between refugee and migrant groups in terms of physical access to digital technology, utilization rates, the skills needed to make best use of the different technologies, and the ability to pay for digital services.[33] Large inflows of migrants and refugees bring unprecedented challenges and place a severe strain on public institutions.

The public services needed for urban migrants versus those who reside in remote rural areas and others who live in refugee camps, often for protracted periods of time, are often very distinct, so different approaches to services provision may be required. Similarly, diverse subgroups of migrants and refugees will likely need different combinations of services.[34] Many countries have created or are considering the creation of one-stop shops for the provision of unified, interlinked services for migrants and refugees. In Denmark, newtodenmark.dk is a one-stop immigration portal consolidating all relevant information and access points to services. While one-stop shops have proved to be a useful institutional innovation, their effectiveness varies widely depending on the context.[35] Outside the direct provision of government services, refugees and migrants may benefit from global or regional initiatives with a digital component. The International Organization for Migration has launched an initiative called Migrants as Messengers, through which returned migrants use technology and in-person communication to share their stories so that prospective migrants can make informed decisions; recently, returnees have provided valuable information on the risks of COVID-19 and how to prevent its spread.[36]

The issue of digital divides and migrant and refugee populations is not fully explored in the existing research and literature.[37] Understanding the critical challenges migrants and refugees experience is crucial in designing e-government policies and has the potential to increase their inclusion in society and decrease immigrant-native achievement gaps.[38] However, the provision of digital services for migrants and refugees needs to be balanced with face-to-face interaction and support.

4.2.7   Other vulnerable populations

The previous paragraphs have illustrated certain groups, but others being left behind in e-government include minorities, indigenous peoples, and those living in rural or remote areas. Generally, the lack of online services for vulnerable groups derives from intentional or unintentional discrimination, cultural barriers, educational opportunities and institutional gaps caused by the failure to identify emerging divides and respond with public policies and services that meet the needs of these groups.[39]

There are also intersectionality and multipliers effect in settings characterized by inequitable power relations and discrimination that can interfere with the ability of women, those living in poverty, and other vulnerable groups to access public services.[40] There is still insufficient understanding of how the design and implementation of e-government affects people of different ages, capabilities and income levels and what needs to be done to address discrimination and ensure equity for all. A number of studies have shown that the most notable progress has been achieved among those groups that are easiest to reach, with many of the poorest and most vulnerable being left behind. Clearly, proactive efforts are needed to acknowledge and identify the gaps, to provide vulnerable populations with mechanisms for engagement so that the types and origins of discrimination are better understood, and to then use what has been learned to develop responsive e-government and improve the lives of those who are hardest to reach. Only 92 countries allow users to report any form of discrimination online, while 95 countries allow users to report violations of labour law online (Table 4.3).

Table 4.3   Online options for reporting discrimination and making declarations to the police

	Number of countries	Percentage
Users can report any form of discrimination (based on ethnicity, age, gender or other factors) online	92	47.7
Users can report violations of labour law online	95	49.2

4.3   Barriers relating to access, affordability and ability (3As)

Leaving no one behind is key to addressing the expansion of digital services to ensure access for all. The operationalization of this objective is critical but challenging, however, as digital inclusion is influenced by a multitude of economic, social and governmental factors relating directly and indirectly to issues around digitalization. People from all segments of society have an equal right to benefit from the advancement of digital government; however, among the poorest and most vulnerable, access to public services continues to be impeded by barriers such as financial cost, geographical location, cultural and environmental factors, discrimination, language-related issues, and the lack of institutional support for equitable digital inclusion in e-government. Different groups have specific constraints requiring targeted solutions.

4.3.1   The dynamic shifts and multiplying effects of digital exclusion

Digital divides are not static. The consensus among researchers is that vulnerability is a dynamic and shifting state, so a list of risk factors is not always sufficient to identify those who need different ways to access and utilize services.[41] There is growing evidence that digital access alone is not enough and that challenges shift over time. Achieving universal digital inclusion requires not only meaningful access to digital services, but also the ability to pay for Internet services and mobile devices, the digital skills required to navigate new technologies safely and productively, and a knowledge of local and general content so that users can take advantage of support services, engagement opportunities,

and other benefits offered. Given the rapidly changing nature of technology, any support provided needs to be ongoing to ensure that users are able to keep pace with technology developments, evolving modes of service delivery, and changing content options. Continuous monitoring and assessment of the shifting needs of vulnerable groups is also required to ensure that the services provided are actually meeting identified needs.

There is a clear link between digital inequalities and socioeconomic stratification, which means that vulnerable populations are less likely than those in more advantaged positions to have positive online experiences and connections.[42] Beyond that generalization, digital divides are actually driven by the dynamic and sometimes complex relationship between multiple factors contributing to vulnerability. The most vulnerable populations tend to experience inequality at many levels; each barrier on its own may lead to exclusion for a particular segment of different vulnerable groups, but those who are most disadvantaged often experience multiple deprivations that exacerbate each other.[43] For example, while women often face particular difficulties in accessing public services and interacting with public institutions, digital divides are especially pronounced when both gender and geography are factors, meaning that rural women, who tend to have lower-than-average incomes, are among the least likely to have meaningful experiences with e-government, even when they have Internet access.[44] An older person with disabilities who lives in a remote area may also suffer from intersecting forms of inequality. The interplay of digital divides is driven not by socioeconomic status alone but rather by the interplay of multiple intersecting challenges and perspectives within the context of external economic, social, cultural and political trends. To address these compounded disadvantages, an integrated policy approach is needed.

In both the academic and policy realms, the conceptualization of digital inequalities has become more nuanced and complex.[45] Many recent publications acknowledge that the digital inequality debate has shifted from digital divides to gradations of exclusion that reflect levels of skill, motivation, engagement, and participation in public policy processes. Greater consideration is being given to the links between digital equity and socioeconomic inequalities and the need to adopt a user-centric approach. What this means for different vulnerable groups in developed and developing countries will vary. Essentially, determinations of digital inclusion or exclusion should consider access (the infrastructure needed for connectivity), affordability (the ability of users to cover the cost of Internet services and devices), meaningful use (digital skills, readiness, individual agency, and the availability of accessibility features to allow full engagement) and benefit (content related to each user's individual situation and requirements). The COVID-19 pandemic has not changed the overarching objective of digital inclusion — that all people should have access to and the ability to use digital services, including e-government services, in a meaningful way.

Some common approaches and indices have emerged to measure and assess digital inclusion. The Digital Inclusion Index developed by Ronald Berger measures and analyses levels of digital inclusiveness in countries based on values associated with four key levers: accessibility, affordability, ability and attitude.[46] The Australian Digital Inclusion Index measures progress across the three dimensions of access, affordability and digital ability, though with different areas of emphasis and definitions.[47] Researchers working with Making All Voices Count identified five A's of digital access—accessibility, ability, awareness, affordability and availability—"as a series of concentric circles that structurally exclude particular groups whenever digital technologies are deployed".[48] In the subsections below, an effort is made to identify digital barriers to leaving no one behind in the realm of digital government by exploring the dimensions access, affordability and ability in some depth (see figure 4.6).

Figure 4.6   The intersectionality of barriers: of access, affordability and ability in determining digital exclusion
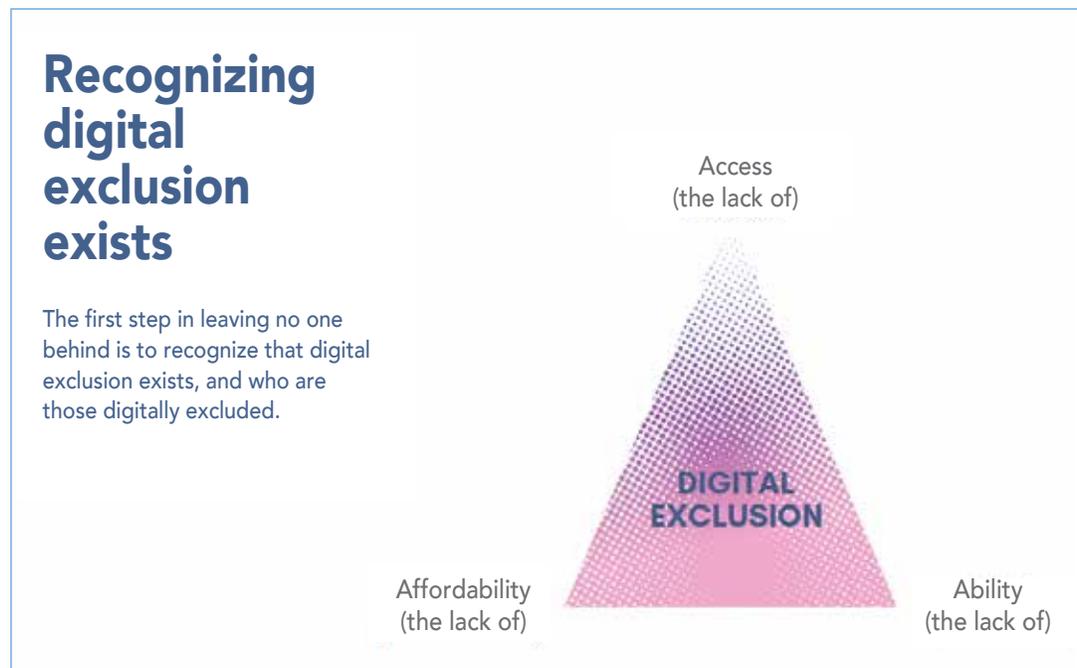
4.3.2   Access

Access is a fundamental requirement for digital inclusion. Access to online information and digital services has become critical for social integration and progress. In recent years, the COVID-19 pandemic has amplified the importance of access and has drawn attention to issues surrounding access or the lack thereof. In countries that have experienced pandemic-driven shutdowns, digital services have been identified as essential services, alongside food production and distribution, health-care provision and other core services;[49] this heightened attention has also served to highlight the digital vulnerability of marginalized groups.

Critical areas of access in the context of e-government include access to electricity, access to the Internet and mobile infrastructure, and access to e-information and e-services.

Access to electricity

Developments in digitalization and digital government have no impact on those who have inadequate or irregular access to electricity. As noted in one report, "without electricity, the Internet is just a black hole".[50] One group of researchers found that that access to mobile connectivity, as measured by mobile phone subscriptions or smartphone ownership in rural areas, increases with access to electricity, with women affected the most.[51] Obviously, access to a stable energy source has a positive impact on usage, as measured by the increased volume of incoming communications and the ability to recharge digital devices.

Communities without access to a stable supply of electricity are typically overlooked by telecommunications operators and Internet service providers because they are seen as too remote or too poor and lack the energy capacity to maintain connectivity. The situation is improving for some, however, as electrification through decentralized, affordable, renewable and sustainable energy solutions has gained momentum in recent years. Globally, the number of people without access to electricity declined from 1.2 billion in 2010 to 759 million in 2019, with three quarters of those affected living in sub-Saharan Africa (see figure 4.7).[52] If the current pace is maintained, an estimated

Figure 4.7   Proportion of the population with access to electricity, selected country groupings, 2010 and 2019 (Percentage)

*Excluding Australia and New Zealand

☐ 2010 ☐ 2019
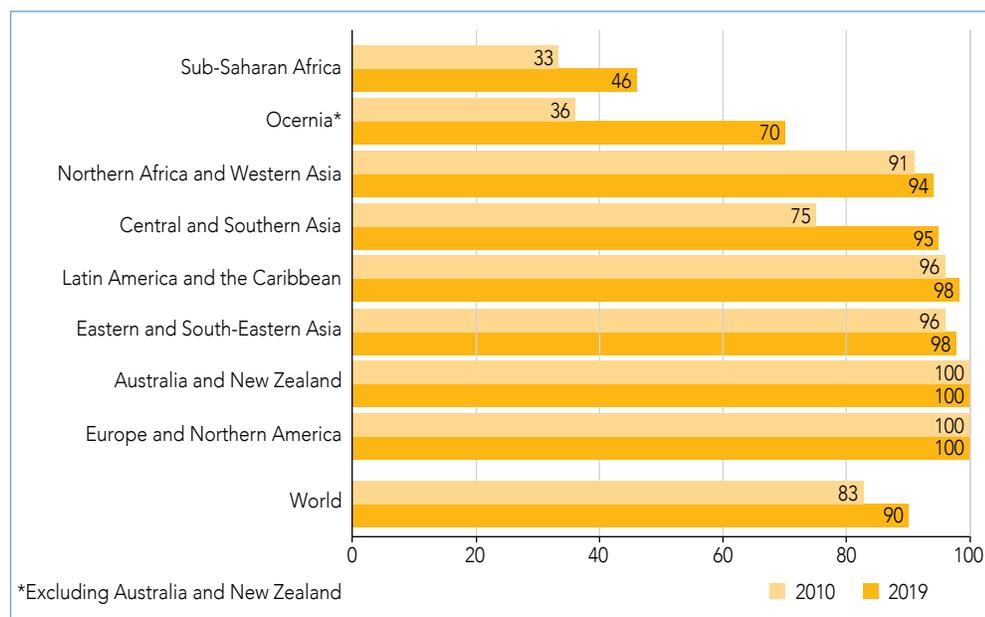
Source: The Sustainable Development Goals Report 2021; available at: https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf

660 million people will still be without electricity in 2030, with the vast majority situated in rural areas of sub-Saharan Africa.[53] It should be noted that the COVID-19 pandemic has reversed progress in some areas, especially in developing countries in Africa and Asia. Basic electricity services are now unaffordable for many people who had previously gained access, largely owing to population growth and increasing levels of poverty. In Asia, it is estimated that an additional 85 million people may be forced to scale back to basic electricity access because of their inability to pay.

The dependence of digital government on access to electricity is evident. A study undertaken in Nigeria found that inadequate power supply has clearly hindered access to digital government services. In rural areas, especially in the least developed countries, many residents do not apply for new utility services because connection costs can be relatively high considering the purchasing power equity. Where access is available, convenient payment mechanisms may not be in place. Data from the 2022 E-Government Survey indicate that 45 countries (23 per cent of those surveyed) still do not provide e-payment options for electricity or gas bills (see chapter 1). Efforts to expand electricity and Internet access should go hand in hand, as close coordination between the energy and telecommunications sectors is both logical and cost-effective; such collaboration can help ensure that all individuals — in particular rural populations in low-income countries — are able to reap the benefits of digitalization.

Access to the Internet and mobile infrastructure

An estimated 2.9 billion people are still offline and are thus being deprived of the opportunity for meaningful engagement in the digital age.[54] The least developed countries are the least connected, with only 19 per cent of the population linked to digital networks. In recent years, much greater attention has been focused on addressing the urgent need to work towards meaningful universal connectivity, as called for in the United Nations Secretary-General's Roadmap for Digital Cooperation

and *Our Common Agenda*, as well as in the global dialogue on digital connectivity, including that taking place within multi-stakeholder contexts such as the Internet Governance Forum.[55] Internet connectivity has accelerated during the COVID-19 pandemic, but the urgency around identifying the barriers to digital access has also grown. In reconsidering strategies for closing access gaps, Governments should consider adopting disruptive approaches to infrastructure development.

Many high-income countries have greatly improved Internet speed, reliability and versatility through the introduction of cutting-edge 5G wireless technology and full optical-fibre deployment. These digital upgrades have contributed directly to higher EGDI values for a number of wealthier countries, but they have also served to widen digital divides. The coverage gap remains significant in Africa; though there has been a 21 per cent increase in 4G coverage since 2020, 18 per cent of the region's population still lacks access to 3G or 4G mobile broadband networks. In the LDCs and LLDCs, the respective proportions are 17 and 16 per cent (see figure 4.8). Estimates indicate that close to 400 million people live where there is no mobile broadband signal.[56]

The target for SDG indicator 9.c—to "significantly increase access to ICT and strive to provide universal and affordable access to Internet in LDCs by 2020"—has not been met.[57] However, efforts to improve digital access for this group of countries continue. The various multi-stakeholder partnership initiatives aimed at establishing reliable, low-cost satellite connectivity for development and emergency telecommunications on remote islands and in rural areas constitute a positive step forward. Innovative business models can be used to combine the provision of energy access and broadband connectivity to vulnerable segments of rural communities.[58]

Figure 4.8   Mobile broadband coverage by type of network, 2021 (Percentage of the population)
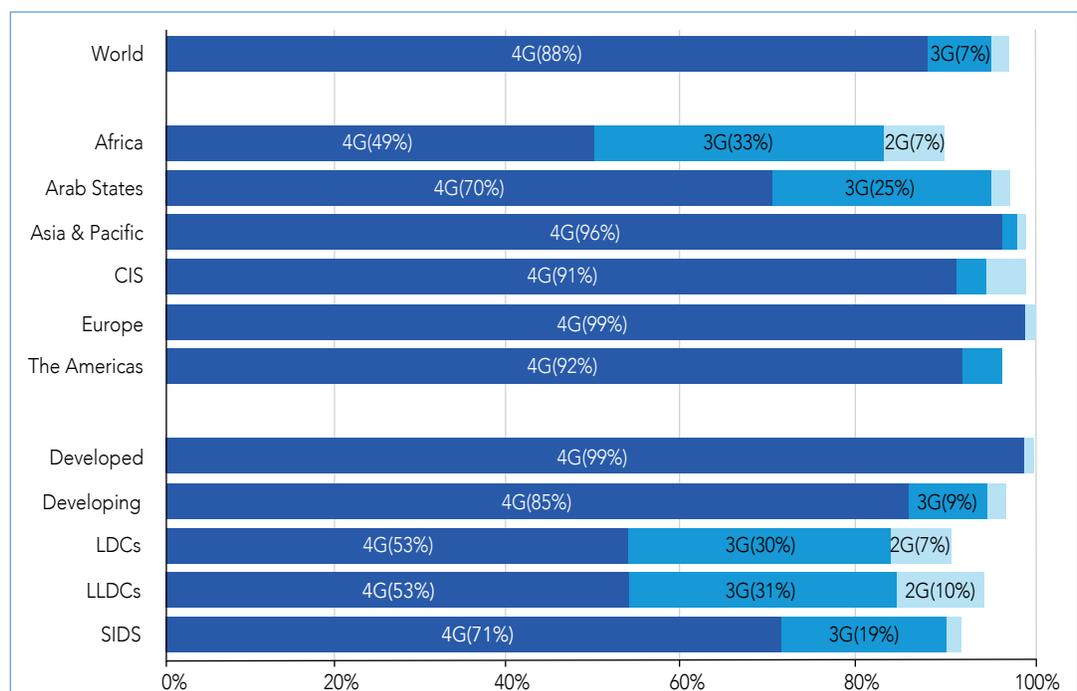
Access to e-information and e-services

Enabling access is not sufficient for e-government inclusion; meaningful engagement among vulnerable segments of the population is possible only if relevant content and services are made available. In a research study undertaken in Rwanda, official estimates indicate that 1 in 5 (or 20 per cent) of the country's residents are using the Internet, but the numbers for meaningful connectivity are as low as 1 in 160 (just over 0.6 per cent).[59] E-government content is wide-ranging and may include, for example, general and sectoral information, links to employment opportunities, access to social welfare programmes, legal advice and recourse options, support for commerce and trade, a multitude of online public services, and e-participation mechanisms. The scope of the e-government divide often extends from access to usage to socioeconomic outcomes. Ensuring public access to information is one of the focal points of SDG target 16.10; specifically, individuals should be able to access information without discrimination, and public information should be presented in a way that is understandable to all. This means that gender bias, cost and language barriers, and other factors that may disadvantage certain population groups need to be addressed in the provision of public sector content. Equitable access to information—in particular information on public policies—must be ensured for the poorest and most vulnerable groups.

The E-Government Survey tracks the provision of online services designed for vulnerable populations. It is encouraging that since 2016 there has been a general increase in the number of countries offering online information and e-services that specifically target vulnerable groups, including women, those living in poverty, persons with disabilities, older persons, and migrants and refugees (see figure 4.8); the only group for which there has not been an increase is youth. The average number of countries providing e-information and e-services has increased from 145 to 151 since 2020. However, very few countries show evidence of having engaged in online consultations involving vulnerable groups, and even fewer countries have evidence showing that user input has been considered or incorporated in policy decisions on issues relating to vulnerable groups. While the information and services gaps have narrowed in recent years, the gaps in e-consultation and decision-making are still very concerning.

A robust, user-focused e-government ecosystem is essential for ensuring meaningful usage and satisfaction among all users, including vulnerable groups. In order to identify the specific needs of different population groups and measure user satisfaction, Governments must collect information from and on users; figure 4.9 shows that there has been slow but steady growth in the number of countries that monitor usage and incorporate user feedback mechanisms on their portals (additional information is provided below). Once needs have been identified, Governments can take proactive steps to update relevant policies and regulations for the digital age. In the realm of banking and finance, for example, new or modified policies and regulations are needed to support the integration of blockchain and fintech options in government portals for e-payments and other financial transactions in order to ensure financial inclusion. Governments can also play a role in promoting digital startups by providing funding, supporting the formation of digital clusters, or facilitating the creation of incubators.

Expanding meaningful usage and enhancing user satisfaction are key to motivating and engaging all users, in particular vulnerable groups. This can only be achieved through continuous monitoring of usage and communication with users. As noted above, there has been some progress in this area, though there is significant room for improvement. A growing number of countries are providing usage statistics and measuring user satisfaction, but not even half of the countries surveyed have met these indicators; only 47 per cent provide usage statistics, and even fewer countries (36 per cent) measure user satisfaction. The proportion of countries that have set up mechanisms allowing users to provide feedback that can be used to improve the accessibility and usability of e-services increased from 64 per cent in 2020 to 66 per cent in 2022 (see figure 4.10).

Figure 4.9 Provision of e-information, e-services, e-consultation mechanisms, and e-decision-making opportunities for vulnerable groups
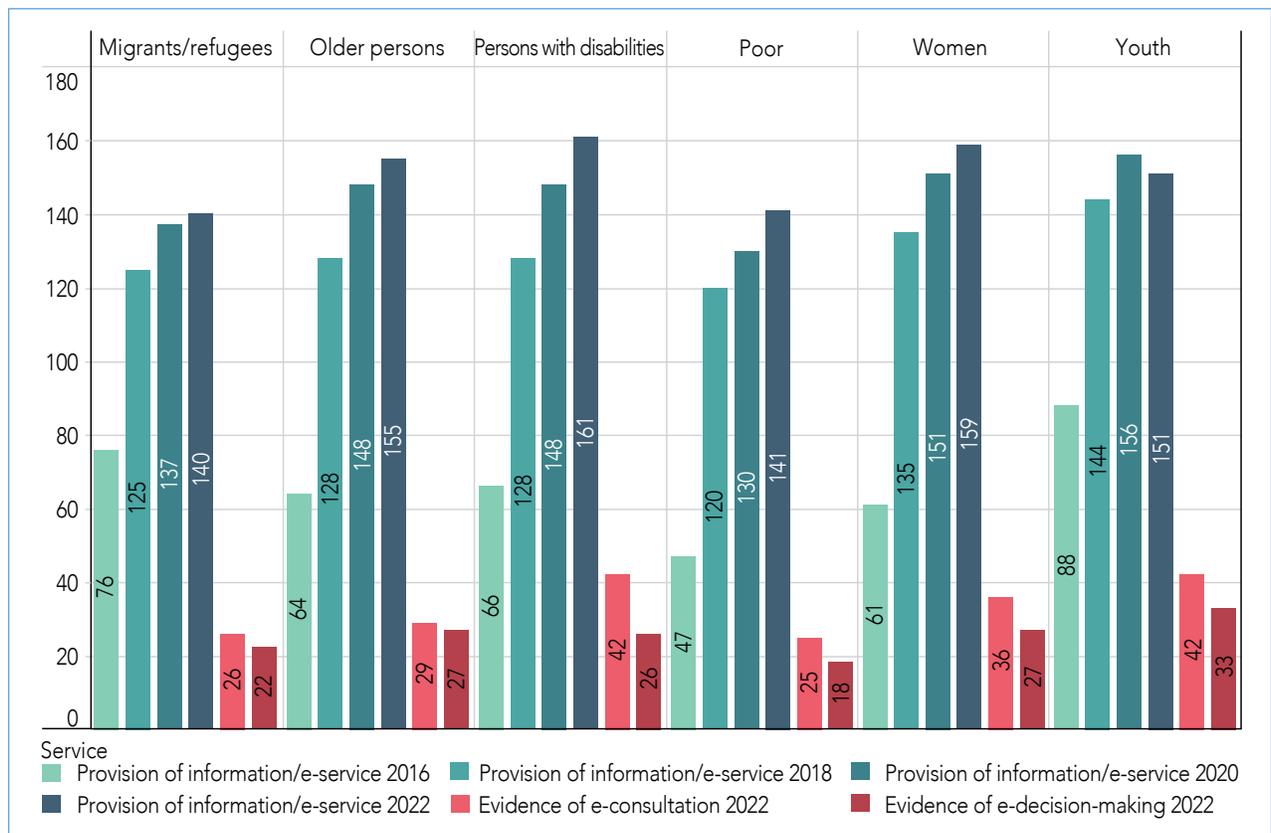
Figure 4.10 Availability of user feedback mechanisms in e-government portals
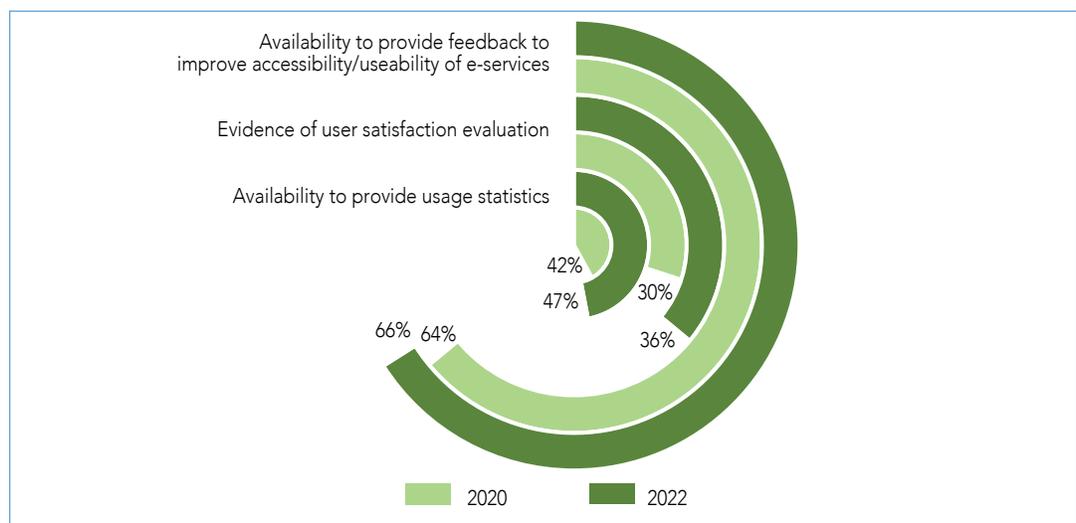
4.3.3 Affordability

Meaningful access to digital information and services remains too costly for many vulnerable groups, especially in developing communities and regions. The growing ubiquity and complexity of digital government make affordability an even bigger concern, as the inability to pay essentially translates

into digital exclusion when those who are most vulnerable are unable to access ever-evolving e-government services and are being left further and further behind.

In this subsection, affordability covers three areas relevant to e-government: (a) the affordability of Internet access, especially broadband (for services requiring high bandwidth); (b) the affordability of cellular phones and other mobile-enabled devices; and (c) the affordability of e-services (some may require direct fees or the payment of fees to an intermediary, and users may need to travel a significant distance to access mobile services or complete e-service transactions). When connectivity remains beyond the reach of individuals or communities, free public access points set up the Government may be instrumental in facilitating digital inclusion.

Affordability of Internet access

There is a strong correlation between the affordability of Internet access and EGDI values. Countries with high GDP per capita have much higher levels of affordability. In developing countries, the cost of connecting remains high relative to income. The ITU/UNESCO Broadband Commission for Sustainable Development urges countries to make broadband prices affordable in developing countries by 2025, with affordability defined as the availability of broadband access at a price equivalent to less than 2 per cent of monthly gross national income (GNI) per capita. In the LDCs, the median price for entry-level broadband has been declining, but it remains beyond the means of the average consumer in all but 4 of the 43 LDCs for which data could be obtained. Among the 33 LDCs for which data are available, only one has met the 2 per cent target for fixed broadband pricing (see figure 4.11).

Figure 4.11 Basket prices for fixed broadband and data-only mobile broadband as a percentage of GNI per capita, 2020
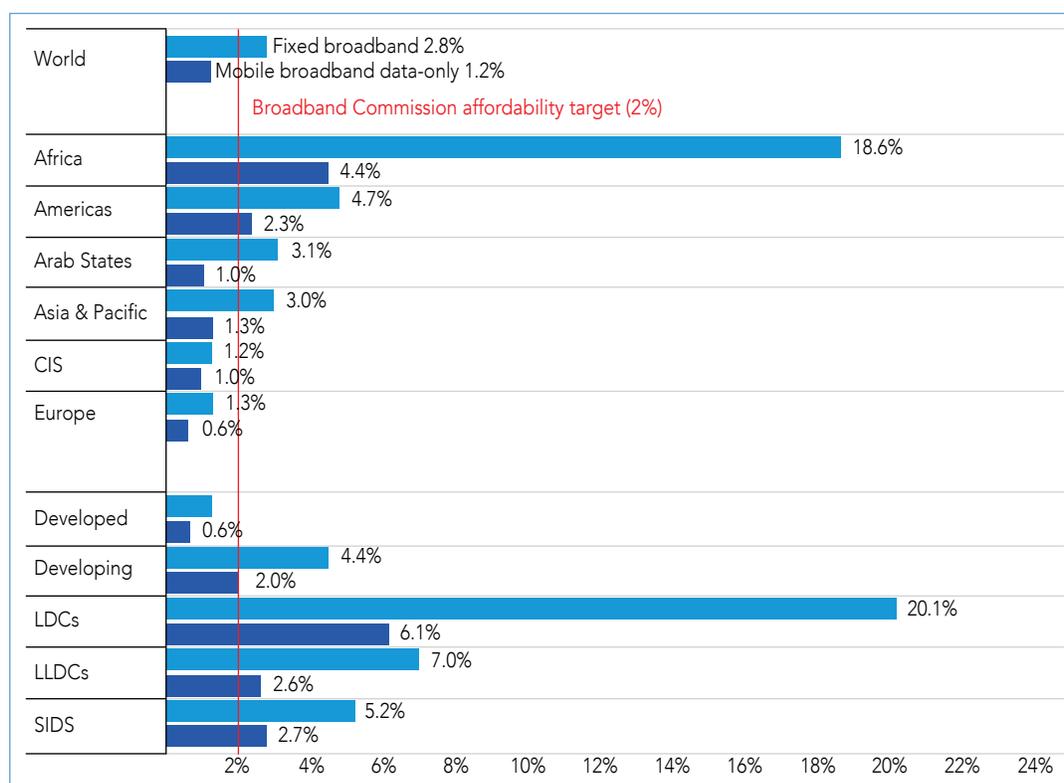
131

Affordability of digital devices

Internet affordability is only one of the factors considered in assessing digital equity and inclusion; the affordability of digital devices is another. Owning a smartphone or other digital device can be transformative; for example, it can give a vulnerable woman starting a small business in a rural area access to online information, finance, markets and government support. Device ownership benefits residents of high-income and middle-income communities as well, but the potential impact on those in vulnerable situations is far greater, especially if they are the archetype of advanced users.

Globally, only 60 per cent of unique mobile subscribers have access to smartphones. The cost of smart devices remains relatively high for the largely low-income populations of many developing countries and transition economies. Many of the newer, more expensive smartphones have advanced accessibility features that would be useful for older people and persons with disabilities, but those who would benefit most from such features — visually impaired individuals living in low-income rural communities, for example — cannot afford them. Some countries, including India and Nigeria, are manufacturing digital devices domestically; local production not only makes the devices more affordable, but also promotes the growth of entrepreneurship and innovation in the local ICT sector.

It is vital to ensure the affordability of devices that can handle the demands of evolving digital trends over a relatively long period. Governments can subsidize digital devices such as laptops and put them into the hands of vulnerable groups where needed; an example would be providing youth with devices for online education during the COVID-19 pandemic. However, the shelf life of many devices can be relatively short due to wear and tear and technology obsolescence. In the mid to long term, these households may not be able to afford replacements for the digital devices they were given. Strategic long-term planning is essential to look at the costs of both devices and broadband connectivity to ensure continued meaningful digital access. When assistive technologies are required, especially for older people and persons with disabilities, the affordability barrier can be even higher.[60] While some Governments have instituted web accessibility policies, these cannot anticipate every accessibility need due to the known limitations of existing technologies. There may be other circumstances independent of technology that limit the accessibility of e-services, such as the financial dependence of certain vulnerable groups and various cultural factors.

Affordability of e-services and the need for public access points

The provision of public access points has been an integral part of national digital strategies over the past two decades. Its contribution to bridging the digital divide and achieving universal meaningful access has become increasingly important, especially in communities frequently underserved by the private market. Key to making this happen are policies that prioritize underserved groups and the provision of free Wi-Fi hotspots or computers in public spaces such as libraries, community centres, public transport interchanges and post offices. During the pandemic, many public libraries and private companies have made their Wi-Fi services available 24 hours a day, with some even improving their services, so that they can be accessed from parking lots outside.[61] According to the 2022 Survey, the number of countries providing free public access points increased from 91 to 103 (or by 13 per cent) between 2020 and 2022, with the relative share growing from 47 to 53 per cent during this period. (See Table 4.4)

Table 4.4   Number of countries providing free public Internet access points, 2018, 2020 and 2022

	Number of countries		
	2018	2020	2022
Countries providing free Internet access through kiosks, community centres, post offices, libraries, public spaces or free Wi-Fi	106 (54.9 per cent)	91 (47.2 per cent)	103 (53.4 per cent)

Public digital access is easier to scale up when it is linked to other policy objectives such as universal education or universal health care. A number of initiatives that reflect such integration or complementarity have already been undertaken, including the UNICEF-ITU Giga initiative for schools[62] and Every Community Connected programme created for libraries.[63] This approach can be extended to include cooperation with public sector partners engaged in infrastructure development—for example, working with energy and transport authorities on "dig once" interventions that can result in cost savings and environmental benefits.[64]

A number of countries have been lauded for their consistent use of effective strategies for ensuring affordable public access.[65] The National Backbone Infrastructure Project for regional government offices in Uganda and the Swedish experience with municipal fibre networks are positive outcomes of strategies involving investment in middle-mile infrastructure, such as municipal networks, that can provide communal access to affordable Internet services.[66]

4.3.4 Ability

As noted previously, access, affordability and ability are interconnected. Access and affordability are closely linked to digital literacy, as opportunities to improve digital competency mean little when individuals are digitally excluded or do not understand how they might benefit from digital connectivity. With countries increasingly shifting public services to virtual platforms, it is becoming imperative that everyone — including those living in poverty, women and girls, older people, persons with disabilities, youth, migrants, refugees, and other marginalized groups — be digitally competent and connected. The COVID-19 pandemic has illustrated the urgency of this mandate; with older people encouraged to stay indoors because of the higher probability of infection for this demographic, the only way for them to stay connected and ensure their physical, mental and overall wellness has been through digital platforms.

An expanded definition of literacy is the ability to read, write, speak and listen in a way that allows one to communicate effectively in traditional and digital environments, as well as the possession of competence or knowledge in a specified area. Illiteracy constitutes one of the greatest barriers to digital engagement; as the primary means of communication on digital platforms is the written language, the inability to read and write seriously limits usage. The three areas of literacy relevant to e-government participation are general (or traditional) literacy, digital literacy and language literacy; the latter two are explored in some detail in the subsections below.

The Human Capital Index (HCI), an EGDI subindex, captures where countries stand in terms of general or traditional literacy; assessments are based on UNESCO data relating to combined primary, secondary and tertiary gross enrolment ratios, expected years of schooling, and average years of schooling (see the methodology section for more information).

Digital literacy

Empowering the digitally excluded to use digital services is vital for sustained engagement in e-government and broader digital inclusion. Countries with high HCI values have clear mandates for prioritizing education, but the same may not be true for digital literacy. While a growing number of countries at all socioeconomic levels are extending or expanding support for digital skill development, much more needs to be done. As shown in table 4.5, at least three quarters of the countries in all regions except Oceania have specific mechanisms or measures in place to help vulnerable groups build digital literacy and skills. Similar trends are observed for special country groupings; 68 per cent of LDCs and 89 per cent of LLDCs have digital literacy support mechanisms in place for underserved populations, but the same is true for only 41 per cent of SIDS.

Table 4.5   Countries that have specific measures or mechanisms in place to help vulnerable groups acquire digital skills and achieve digital literacy

		Total	Yes	No	Not applicable or no response	Yes	No
By region	Africa	27	22	5	0	81%	19%
	Americas	17	13	3	1	76%	18%
	Asia	40	34	4	2	85%	10%
	Europe	38	33	4	1	87%	11%
	Oceania	7	3	4	0	43%	57%
By special group	LDCs	25	17	8	0	68%	32%
	LLDCs	19	17	1	1	89%	5%
	SIDS	17	7	9	1	41%	53%
	Total	**129**	**105**	**20**	**4**	**81%**	**16%**

As the digital world can be intimidating for newcomers, there is a need for effective programmes that actively support the building of digital literacy, skills and confidence across the primary, secondary and tertiary levels, with policy priority given to vulnerable groups. Governments must ensure that digital literacy policies and programmes keep pace with advancements in technology, are flexible enough to meet the diverse needs of different vulnerable groups, and are empathetic to the challenges faced by certain groups of learners, including women and girls, older people and persons with disabilities.

Very often, the first step in achieving digital literacy is building digital awareness. Some segments of the population may not even know that e-government services are available, so campaigns that promote awareness and ICT usage can help drive digital inclusion efforts. Such campaigns should focus not only on exploring e-government but also on building trust, strengthening digital confidence, and broadening ICT knowledge and experience more generally. Content might focus on the following:

- Appreciating the convenience and benefits of e-government services and Internet banking;
- Registering and managing personal data and information needed to access e-government services;
- Exploring digital offerings such as search engines, social media, and ICT tools for online collaboration;
- Understanding and applying basic cybersecurity principles, with emphasis given to recognizing cybercriminal activities, disinformation, misinformation and fake news.

To some extent, digital exclusion is perpetuated by a vicious cycle rooted in ignorance: many of those who are digitally excluded do not see the need for digital devices or access, those who do not see the need for them do not have them, and those who do not have them are digitally excluded. This dynamic has been identified through research, where due to digital illiteracy and financial constraints, low-income households would not prioritize buying a digital device or paying for an Internet connection, and should they have the means to do so, they would choose mobile-first or mobile-only connectivity. Insufficient knowledge and skills are in themselves an impediment to meaningful digital connectivity.

Digital illiteracy remains a significant barrier for vulnerable groups, putting them at risk of being left further behind. While the benefits of building digital literacy among vulnerable groups are evident, it is difficult to move forward without objective statistical data. Much of the data gathered thus far may be seen as subjective, involving self-reporting or informal assessments of ICT skills.[67] Among the 40 per cent of countries for which digital literacy data are available, fewer than 40 per cent of individuals are reported to have carried out one of the activities that reflect basic skills, such as sending an e-mail with an attachment within the previous three months.[68]

Language literacy

Language is a key component of human interaction. Governments endeavouring to move beyond rhetoric and reach those left furthest behind must also acknowledge the importance of leaving no language behind. In e-government, genuine engagement is possible only if users can communicate in their own language.

The low volume of local-language content constitutes a barrier to e-government participation and broader digital inclusion. There are around 7,000 languages in the world, yet only 7 per cent of them are reflected in published online material.[69] Facebook, for example, is seen as the most multilingual online social media platform, yet it supports only 111 languages.[70] A UNESCO survey found that 98 per cent of the Internet's web pages are published in just 12 languages, and more than half of them are in English.[71] This trend is mirrored in e-government portals.

For the 2022 E-Government Survey, the assessment of each national portal was carried out by a native speaker of the official language of the country or, where that was not possible, by a speaker of one of the languages available on the site. Over 70 different languages were assessed among the 193 Member States. While it is encouraging to note that portal content in the vast majority of countries is available in more than one of the country's official languages (see table 4.6), linguistic diversity remains relatively limited in e-government portals both within and between countries. Among the countries surveyed, 156 offer portal content in only one language (the official national language), leaving only 37 countries that provide content in two or three official national languages. Figure 4.12 shows the primary official language used for portal content and assessment; English is used by the greatest number of countries (51), followed by French (23), Spanish (20), Arabic (18), and Portuguese (8), with many other countries using less common languages for their portal content. Not having portal content available in multiple languages makes it harder for those who speak one of the excluded languages and leaves many indigenous cultures without a voice online.[72] Those who are proficient in English, commonly perceived to be "the language of the web", have an edge when it comes to developing digital abilities and enjoying the benefits of e-services.

The lack of language diversity in e-government portals leads to the underutilization of e-services and miscommunication between government authorities and constituents—which can serve to undermine progress towards the SDGs. Some policymakers and researchers may argue that a *lingua franca*, or common language for communication, is needed for digital government, but this would still leave many of those with a different mother tongue unable to take full advantage e-government information and services. Where proficiency in the portal language is low or non-existent, e-government engagement is far less likely to occur.[73] If Governments continue to offer content in one or a very limited number of languages, many will be left behind.

Language barriers and the isolation they cause are real and deeply ingrained. Greater consideration needs to be given to meeting the needs of different linguistic groups, creating support networks (including intermediaries), and introducing more linguistic coloration in general. On 21 February of every year, the United Nations celebrates International Mother Language Day as a reminder of the power of language in preserving the uniqueness of human societies and promoting their

Table 4.6   Countries with national portals that have content available in more than one official language, 2020 and 2022

	Number of countries	
	2020	**2022**
Countries with national portal content available in more than one official language of that country [Note: the count includes countries with one official language]	166 (86.0 per cent)	158 (81.8 per cent)

Figure 4.12   Primary official language in which content was assessed for each of the national portals
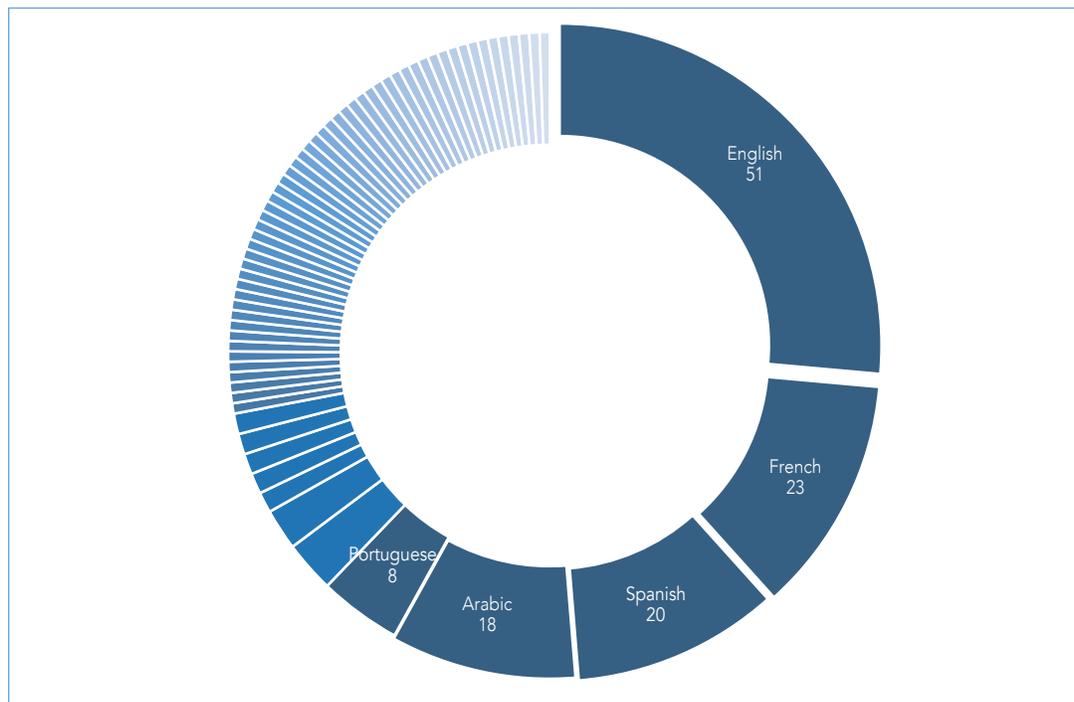
Source: United Nations 2022 E-Government Survey.

distinct values.[74] The theme of International Mother Language Day in 2022—"Using technology for multilingual learning: challenges and opportunities"—aims to promote the use of technology in advancing multilingual education.[75] One of the founding principles of the European Union is multilingualism, as the member countries are collectively home to 24 official languages and over 60 regional or minority languages.[76] In Africa, one noteworthy initiative is the Science and Language Mobility Scheme Africa, which "seeks to build language skills and cultural capabilities of researchers … [to address] one of the barriers to intra-Africa scientific collaboration".[77] Artificial intelligence (AI) applications such as natural language processing can play a vital role in promoting multilingual communication as they offer immediate and relatively high-quality translations of content at low cost.

At the United Nations Internet Governance Forum, multilingualism is a recurring theme, with relevant issues addressed from different perspectives. Among the conclusions reached by the Forum are that translation in portals is inadequate, especially when dealing with interactions involving "minor" languages; that while technology is essential for dealing with multilingualism on the Internet, it does not constitute a solution; and that establishing institutional multilingualism requires broad actions from different stakeholders, including Governments and civil society.[78]

4.4   The role data, design and delivery can play in ensuring no one is left behind

Even with the accelerated adoption of digital technologies and the expansion of e-government during the pandemic, the benefits of digitalization remain unequally distributed, and the gaps between leaders and laggards has grown wider. Digital technologies have been used by Governments to integrate and streamline internal processes and improve services delivery. Vulnerable groups face barriers relating to access, affordability and ability, but they can also be deterred by the rapid advancements in

technology and the complexity and associated risks of digital tools. An understanding of why certain groups or individuals are effectively excluded can inform the approaches taken by Governments to achieve digital inclusion.

In order to address evolving needs within the new hybrid digital society and ensure that no one is left behind, Governments may need to rethink, revise or even revolutionize the way they provide services and interact with the public, with particular attention given to vulnerable populations, and through an integrated offline-online approach. It is important to shift the focus from abstract visions to functional solutions that answer objectively assessed needs. This section offers an integrated framework for e-government engagement grounded in three essential elements (see figure 4.13):

- *Data* informed by the specific needs of vulnerable groups;
- *Design* that places people at the centre of e-government policy processes and services provision;
- *Delivery* approaches that focus on inclusion and the use of innovative approaches (such as blended/omnichannel delivery, pilot initiatives, experimentation and sandboxing) to reach those left furthest behind.

Figure 4.13 Integrated data-design-delivery framework for e-government

Integrated framework in leaving no one behind

The integrated framework of data, design and delivery (3D's) in leaving no one behind seeks to have a transformational impact, making the best and optimal use of available resources in a timely manner.

Data

LNOB
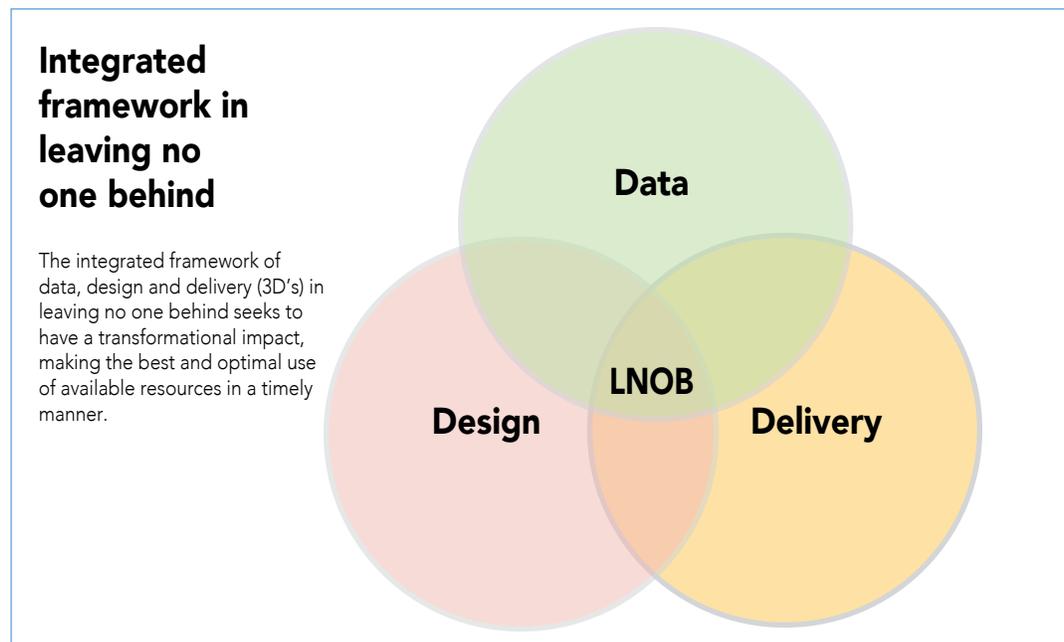
Design   **Delivery**

Strategies centred around data, design and delivery are not new, but they have not been used widely by Governments in an integrated framework. These "3D's" are intersecting tools that can have a transformational impact. Taken together, they can improve e-government for all but are likely to have the greatest effect on vulnerable populations, given the challenges disadvantaged groups face with regard to meaningful digital access and connectivity, the affordability of mobile devices and Internet connectivity, and the ability to engage in and benefit from e-government.

4.4.1 Data

Reliable data are essential for policy development and decision-making at all levels but are especially critical for ensuring that no one is left behind. It is evident that many countries across the EGDI spectrum do not have sufficient data to assess the e-government status of vulnerable groups or to identify critical gaps. The collection, analysis and application of relevant data are imperative for the public sector, as appropriate decisions cannot be made or actions taken if the needs of constituents are poorly understood. Three priority areas relating to data—disaggregated data, open government data and digital identity—are examined below.

Identifying variables and securing data that pertain to leaving no one behind can present two major types of challenges. The first challenge relates to the analytical and operational constraints surrounding data collection, analysis, monitoring and evaluation. Governments do not always have the financial resources or the administrative, technical or human capacities to undertake household or other types of surveys, and they may also face difficulties in identifying and reaching different vulnerable groups.[79] The second challenge is more fundamental in that it relates to the conceptualization of leaving no one behind and the identification of relevant measurement parameters. In a report released by the Open Data Institute, several SDG targets are used to measure leaving no one behind. Another approach used by some countries is based on the Multidimensional Poverty Index, which can be adapted to national or local contexts and conditions to better evaluate leaving no one behind. Surveys of human and social inclusion/exclusion and those that assess social capital and trust can also complement the measurement and operationalization of leaving no one behind. To a certain extent, the E-Government Survey assesses the availability of e-government services that address the needs of the most vulnerable segments of the population.

Disaggregated data

Very often, reliable disaggregated data on segments of the population that do not benefit from e-government or those who have experienced discrimination and exclusion are scarce or non-existent.[80] Most affected — and therefore most in need of data coverage — are those living in poverty, women, and others who have experienced marginalization.

Disaggregated data and analytics are at the heart of digital services operationalization, especially for vulnerable groups, and are essential for assessing e-government progress in leaving no one behind.[81] Without data, vulnerable populations are invisible in the digital society. Uncounted individuals and groups can be further marginalized by their exclusion from statistics and administrative data. Caution should be exercised when dealing with data disaggregation as it relates to disadvantaged groups; while counting or tracking can reflect existing inequalities, it can also exacerbate them.[82] The smart use of data and foresight will be key to understanding the challenges and needs of vulnerable populations and planning how services can be developed to accommodate their needs. Big data, real-time data and geospatial data constitute important sources of information and support in assessing and addressing the situations of the poorest and most vulnerable.

High-quality, timely, accessible and reliable disaggregated data are essential – but often missing, for the implementation and evaluation of e-government policies and initiatives aimed at ensuring no one is left behind, as such data highlight the challenges and needs of different population groups and guide Governments in the development of targeted solutions.[83] Gathering and processing data and designing and executing appropriate evidence-based policies will support the creation of responsive e-services. This approach can help reduce inequalities because it is focused on meeting self-identified needs; targeted e-services could, for example, serve youth by linking young people to decent work and employment opportunities or promote gender equality by facilitating women's access to the services they need most.

At this point, many countries have underdelivered on their pledge to help disadvantaged countries strengthen their data infrastructure; SDG target 17.18 gave countries until 2020 to demonstrate that serious efforts were being made to "enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts".[84]

There is a lack of longitudinal data on many e-government subdomains, including social components such as in e-health and e-education. Even without hard data, it is generally agreed that progress in e-government development has benefited those groups that are easiest to reach, while many of the poorest and most vulnerable have been left behind. While various studies have highlighted cases in which incentives were provided to specific disadvantaged groups, which then benefited most, these constitute the exception rather than the rule.[85] From a policy perspective, the lack of disaggregated data is problematic because there is little to no objective evidence to guide the design of targeted e-government interventions that could address the challenges faced by the vulnerable segments of society.[86] Where disaggregated data are available, evidence is likely to suggest that the most disadvantaged groups benefit less from e-government development than the rest of the population, contributing to widening inequalities. It is also concerning, based on the sparse data available, that during periods of uncertainty such as the COVID-19 pandemic, those living in poverty and other vulnerable groups tend to be at greater risk of social and economic exclusion.

Open government data

There are innumerable benefits associated with open government data (OGD)[87]. For instance, OGD can stimulate innovation through people-centric analytics and applications, leading to the provision of services tailored to the needs of vulnerable groups.[88] Providing open data through an online portal, if implemented effectively, can enhance transparency and reduce the time and resources associated with public requests for data, allowing academics, businesses and civil society organizations that contribute to digital inclusion efforts to gain new insights into complex policy issues surrounding the principle of leaving no one behind. OGD provides important opportunities, and its impact on vulnerable groups and leaving no one behind should be further examined. However, it is essential for Governments to develop rigorous protocols for protecting the privacy of vulnerable groups and safeguarding the confidentiality of the information as appropriate.

With the availability of open government data, especially data relating to vulnerable groups, institutions can be held accountable. On the other hand, data may well be skewed against vulnerable groups because they are less likely to be included. Tracking government spending for vulnerable groups in sectors that provide essential services would provide important metadata on the number and demographic composition of those in danger of being left behind in development efforts.[89] Such data—disaggregated as needed—should be made available in an open data format to enhance accountability and transparency. The E-Government Survey tracks the availability of open data (in both non-machine-readable formats such as PDF and machine-readable formats such as XML) on expenditure in key sectors, including education, health, justice, social protection, environment and employment. Among the 193 countries surveyed, only 65 provide OGD on social protection in machine-readable formats, and 63 provide OGD on social protection in non-machine-readable formats.

Digital identity

To utilize data to serve disadvantaged segments of the population and deliver effective e-services for all, it is first necessary to identify the individuals that make up each demographic. There are an estimated 1.5 billion people in the world who do not have official documentation to prove their identity,[90] and an estimated 2.5 billion are excluded from access to banking and financial services such as savings accounts and monetary loans.[91] The aim of SDG target 16.9 is to provide legal identity for all, including free birth registration, by 2030. Standardized identification systems offer opportunities to meet this target and are essential for ensuring the inclusive distribution and efficient administration of digital health, finance, education and other e-services.

Countries are increasingly turning to digital identity systems as a foundational platform for other digital tools and services that help vulnerable groups. Civil registration and the establishment of a legal identity are preconditions for empowering vulnerable groups through data and ensuring that they benefit from the range of digital services available. MSQ findings for 2022 indicate that Europe has the highest proportion of countries with laws or regulations on digital identity (93 per cent), followed by Asia (81 per cent), Africa (55 per cent), the Americas (50 per cent) and Oceania (18 per cent) (see figure 4.14).

Digital identity is not only a prerequisite for the inclusive distribution and efficient administration of e-services but is also the key to accessing information and the benefits of development People who have an officially recognized identity are more aware of and are better able to exercise their legal rights, have increased access to services, can make more informed choices, and are more likely to be engaged in e-government, including decision-making.[92]

Figure 4.14   Number of countries with laws or regulations pertaining to digital identity
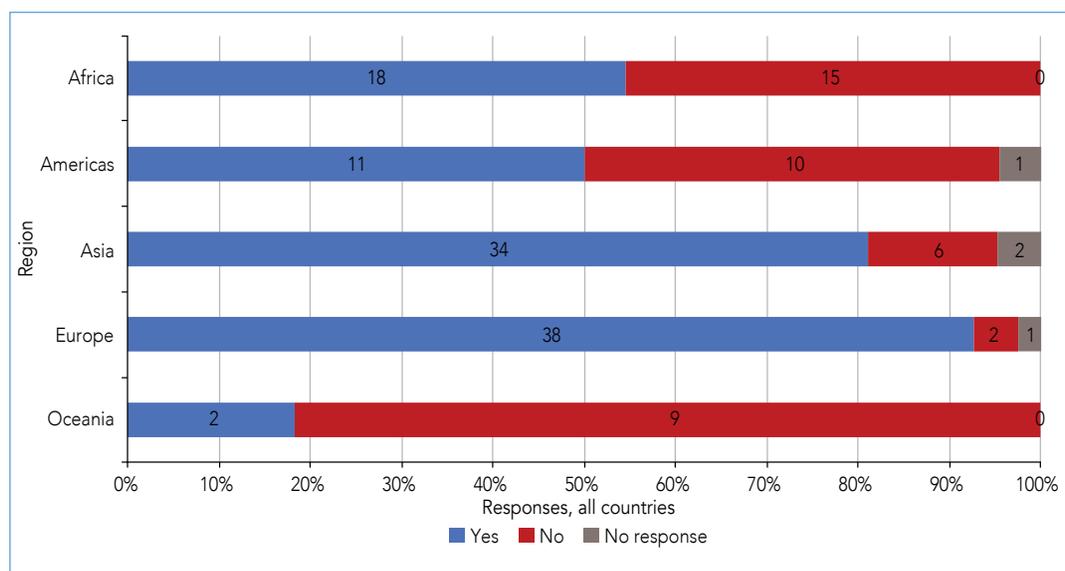
Source: 2022 Member States Questionnaires.

> **Box 4.3   Digital identify and social support for refugees in Poland**
>
> Since the outbreak of the war in Ukraine in February 2022, the Polish authorities have taken immediate action so that Ukrainian war refugees could apply for a Polish national ID Number which allows them to fully benefit from the assistance offered by the Polish central and local government units, such as gaining access to the national healthcare system and educational system under the same conditions as the Polish citizens. The process of assigning the PESEL identification number in a non-discriminatory way (i.e., it is assigned in the same way to Ukrainian citizens and to the Polish). The ID number, known as PESEL, was made available to Ukrainian refugees as soon as just three weeks after the war in Ukraine has broken out. Any refugee can register at any commune office by submitting a filled-in application form and a photograph. Ukrainian citizens who are over 18 years old can also create a **_Profil Zaufany_** (Trusted Profile), to allow them to use public administration services online as some services are available exclusively on the Internet. Within first weeks there were over 270k new Trusted Profiles registered.

4.4.2   Design

While important advances have been made in e-government over the past two decades, inclusive design has not received sufficient attention. Governments will continue to transition from traditional to digital modes of public services delivery, and those e-services that are not designed to facilitate inclusion will likely be underutilized by vulnerable groups, effectively denying them the rights and opportunities enjoyed by more advantaged populations in the hybrid digital society. E-government portals and services should be developed in a way that allows them to be used by as many people as possible, including the poorest members of the population, women and girls, older people, persons with disabilities, youth, migrants, refugees, and other marginalized groups.

Designing for inclusion, including e-inclusion, is critical for leaving no one behind, but it can also be a driving force for creativity in e-government. An important first step is recognizing that exclusion exists—largely because perceptions and solutions are driven by (often unconscious or unintentional) biases rather than by objective, data-driven evidence.[93] Once identified and acknowledged, exclusion should be seen as an opportunity to explore new ideas and inclusive designs, to learn from human diversity, and to put people at the centre from the beginning of the e-government development process. The principle of "solve for one, extend to many" could also be applied; as an example, designing for persons with disabilities could actually end up benefiting the general population.

E-participation and e-engagement

As a precondition, inclusive design requires input from the public, in particular those being left behind. This approach is aligned with SDG target 16.7, which calls for ensuring responsive, inclusive, participatory and representative decision-making at all levels. As the target implies, actions taken to assess or achieve inclusion should extend beyond the collection of public feedback. Using sex, age, disability status and population groups as key indicators to assess relative rates of participation in national and local institutions such as legislatures, public service and the judiciary and comparing them to national distributions (as set out in SDG indicator 16.7.1) can help public institutions identify gaps in representation and inclusion. Over the past two decades, a growing number of Governments have recognized the importance of e-participation, especially for underserved populations. In most regions and special country groupings more than half of the countries provide e-participation support for vulnerable groups; the two exceptions are Oceania (29 per cent) and SIDS (24 per cent) (see table 4.7).

Table 4.7   Countries that have e-participation measures or mechanisms in place for women and other vulnerable groups

		Total	Yes	No	Not applicable or no response	Yes	No
By region	Africa	27	17	10	0	63%	37%
	Americas	17	10	6	1	59%	35%
	Asia	40	28	10	2	70%	25%
	Europe	38	22	15	1	58%	39%
	Oceania	7	2	5	0	29%	71%
By special group	LDCs	25	14	11	0	56%	44%
	LLDCs	19	14	4	1	74%	21%
	SIDS	17	4	12	1	24%	71%
	Total	129	79	46	4	61%	36%

Governments are not seen to be inclusive unless active steps are being taken to include marginalized sectors in the planning and delivery of public services.[94] Public authorities and institutions should proactively reach out to the poorest and most vulnerable to engage them in shaping e-government policies and designing e-services that respond to their needs. This requires a mix of tools and approaches, with the choice of policy instruments partly determined by "whether or not the process is transparent, and stakeholders are involved".[95] The openness of policymakers to promoting e-participation and seeking collective solutions is essential.[96] With the limited resources available, especially among countries at the low and middle EGDI levels, policy approaches must be innovative. Such approaches will succeed only if they are designed and implemented in a bottom-up integrated fashion, with the relevant communities and concerned government entities aligning their objectives and cooperating with one another to respond to the needs of vulnerable groups.

The availability of e-participation platforms does not always translate into broader or deeper participation.[97] In many countries, the utilization of e-participation mechanisms remains low. As shown earlier in figure 4.8, very few countries can show evidence of having had recent online consultations involving vulnerable groups, and even fewer countries have evidence indicating that public input is considered or incorporated in policy decisions on issues relating to vulnerable groups. There are more countries that have held consultations with persons with disabilities and youth (42 countries each) than there are those that have engaged with refugees/migrants (26 countries) or the poorest segments of the population (25 countries) (see table 4.8). Vulnerable groups should be engaged not only to be heard but also to be agents of change for building community resilience through e-participation. The value of public services is increased when people and non-governmental organizations (NGOs) can provide objective feedback on the realities surrounding services provision, as this helps to identify obstacles, call attention to gaps, and encourage pragmatic responses.

E-participation should complement rather than replace traditional forms of public participation in efforts aimed at ensuring no one is left behind; face-to-face meetings, paper-based communications, telephone calls, physical bulletin boards, and other hands-on modalities are still important. Strengthening the inclusiveness of vulnerable groups requires the provision of physical public space for the engagement of vulnerable groups, particularly at the local level. Public spaces are integral to successful community development. Public institutions can also combine digital and face-to-face approaches to facilitate complex discussions involving large numbers of people and incorporating a diverse range of views and interests. A number of Member States have successfully created digital spaces that have brought together offline and online participants to identify and explore key sectoral issues (such as those surrounding the current pandemic) through electronic deliberation and dialogue and to then communicate their concerns and findings back to the Government. Further

action is required to develop similar digital or hybrid modalities and supportive polices that promote engagement aimed at addressing the concerns of vulnerable groups.

Co-design and co-production of e-services

Bridging the digital divide is a massive undertaking, but it is achievable through the co-design, co-creation and co-production of e-services with other stakeholders, including the private sector and the community at large. Drawing from successful cases of collaboration, this could be initiated proactively by the Government to uncover new potential that could propel the inclusive design of e-services to greater heights in the future. Vulnerable groups themselves should be included in designing the projects and solutions that serve their communities. As shown in figure 4.15, this has yet to become a dominant trend; of the 193 countries surveyed, only 42 have made some headway in co-creating education e-services (the highest number among the six sectors assessed), and only 22 countries have engaged in the collaborative development of justice-related e-services (the lowest number).

Figure 4.15   Low numbers of countries engaged in the co-design, co-creation and co-production of e-services in six sectors
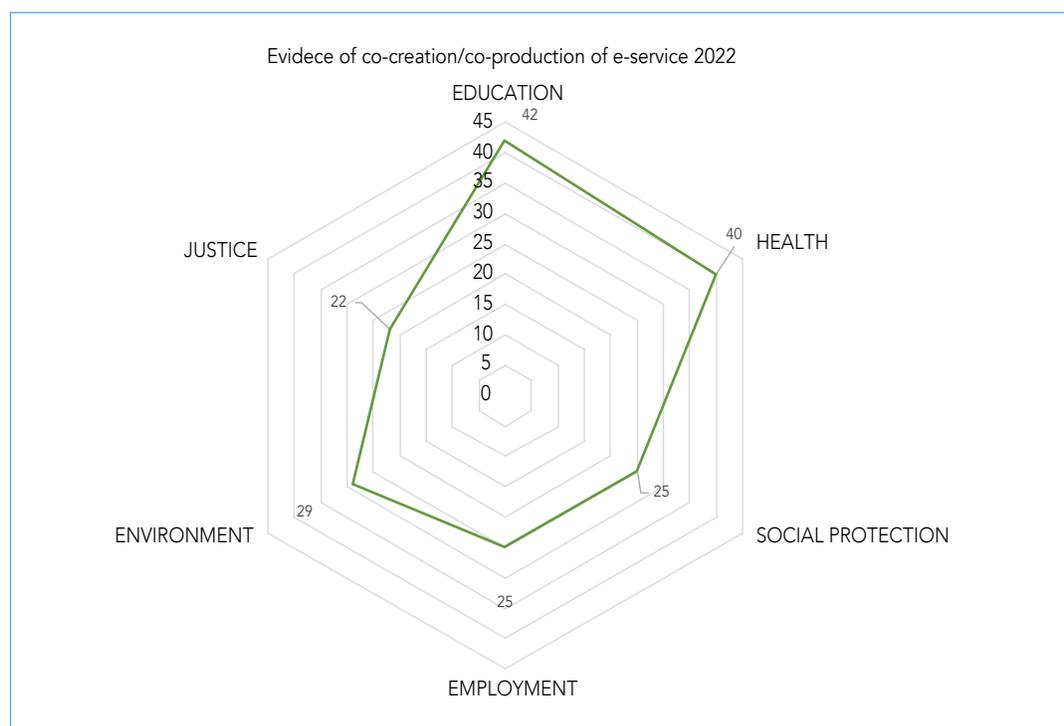
One of the reasons disadvantaged groups continue to be underserved in today's hybrid digital society is the distance between policymakers and the people they serve. Understanding and working closely with vulnerable groups and conducting ongoing research, experimentation and assessment are all essential for getting public polices and public services right in the digital age. Using behavioural science and in-depth user research to connect vulnerable populations with essential e-services can help these groups improve their quality of life and stay healthy and safe.

It is vital that vulnerable groups be involved in the development of e-services, as they offer a personal, experiential perspective on the challenges they face. Persons with disabilities, for instance, have unique insights about their disabilities and situations and should be consulted and actively involved

in the formulation and implementation of relevant policies, laws and services so that Governments can better understand their needs and how e-government can address them. In Pakistan, a multi-stakeholder working group on ICT accessibility[98] — comprising persons with disabilities, organizations working on disability issues, government organizations, and businesses and developers—successfully introduced a component relating to persons with disabilities in the draft IT policy of Pakistan.[99] In India, where some of the world's largest gender gaps prevail, the Sanchar Shakti programme is focused on the inclusion of women in project design.[100,101] The co-design, co-creation and co-production of public services through inclusive engagement can reduce the potential for incorrect assumptions to become a stumbling block to successful implementation of a project and thereby improve outcomes.[102]

Transforming the development and delivery of public services for the most vulnerable requires the input of a wide range of non-traditional actors — including community activists, philosophers, anthropologists, economists and sociologists — on the complex context of leaving no one behind.[103] There continues to be a disproportionate emphasis on building technocratic capacities in e-government agencies, and while programmers and data analysts are important, they do not have the skills, experience or expertise needed to design or administer e-services for vulnerable groups. A more effective, inclusive approach involves working with non-State actors on the design and provision of assistance and services for those left furthest behind. Governments need to make sure mechanisms are in place to ensure that there are adequate standards for public services and shared accountability among State and non-State actors for the delivery of high-quality services for all, with special attention given to the poorest and most vulnerable.

Targeted services for vulnerable groups

There is a global trend towards the adoption of digital-by-default, digital-first, invisible-government and one-stop-shop strategies, but such approaches contribute to the risk of leaving more people behind in the hybrid digital society. Not all excluded groups are confronted with the same barriers or are affected to the same extent, so targeted, localized and contextual approaches may be needed.

While some integrated policies should be universal in nature, benefiting all people, others may need to be more targeted, focusing on strategies such as affirmative action and solutions tailored to specific needs. For the latter, differentiated criteria such as specific sets of vulnerabilities or geographical variables can be used to determine the target recipients of intended services.[104] For example, specific e-services may be needed for young women, older persons with disabilities, or those dwelling in rural areas. Social protection policies aimed at promoting social integration and addressing discrimination should be designed for targeted groups to achieve specific outcomes and real change. These policies should be based on evidence drawn from disaggregated data on various marginalized segments of society, and robust implementation mechanisms should be established to ensure effective services delivery. Social protection measures such as digital cash transfer systems can be designed to reduce poverty and protect against a range of risks, vulnerabilities and life-cycle contingencies such as unemployment, old age, childhood, maternity or sickness. Figure 4.16 illustrates the steady increase in recent years in the number of countries providing specific information and/or e-services for all vulnerable groups except youth.

Increasingly, quality improvements in public services delivery are linked to service personalization and the use of predictive analytics to identify target populations.[105] Complex analytics and AI allow public institutions to better understand and address the needs of different segments of the population, including vulnerable groups. Governments utilizing these tools can acquire the information they need to develop tailored solutions such as personalized education for disabled persons or can use predictive analysis to develop precision health-care solutions for older people.

Figure 4.16   Progress made in the provision of specific information and/or e-services for vulnerable groups, by region, 2018-2022

		Africa	Americas	Asia	Europe	Oceania
Poor	2018	50.0% /27	62.9% /22	55.3% /26	62.8% /27	71.4% /10
	2020	40.7% /22	68.6% /24	78.7% /37	93.0% /40	50.0% /7
	2022	51.9% /28	77.1% /27	80.9% /38	93.0% /40	57.1% /8
Persons with disabilities	2018	50.0% /27	77.1% /27	66.0% /31	67.4% /29	71.4% /10
	2020	50.0% /27	85.7% /30	83.0% /39	97.7% /42	71.4% /10
	2022	63.0% /34	91.4% /32	89.4% /42	100.0% /43	71.4% /10
Older persons	2018	48.1% /26	71.4% /25	61.7% /29	69.8% /30	71.4% /10
	2020	59.3% /32	91.4% /32	78.7% /37	97.7% /42	64.3% /9
	2022	57.4% /31	88.6% /31	87.2% /41	100.0% /43	64.3% /9
Migrants and refugees	2018	48.1% /26	65.7% /23	61.7% /29	58.1% /25	50.0% /7
	2020	50.0% /27	77.1% /27	80.9% /38	93.0% /40	35.7% /5
	2022	48.1% /26	71.4% /25	85.1% /40	97.7% /42	50.0% /7
Women	2018	61.1% /33	80.0% /28	57.4% /27	55.8% /24	78.6% /11
	2020	61.1% /33	88.6% /31	80.9% /38	88.4% /38	85.7% /12
	2022	72.2% /39	85.7% /30	89.4% /42	86.0% /37	78.6% /11
Youth	2018	59.3% /32	88.6% /31	72.3% /34	67.4% /29	64.3% /9
	2020	66.7% /36	91.4% /32	78.7% /37	90.7% /39	85.7% /12
	2022	59.3% /32	85.7% /30	76.6% /36	95.3% /41	85.7% /12

Box 4.4   Social protection disbursements in Togo - through AI enabled by mobile data and satellite imagery

To alleviate poverty and hardship during the COVID-19 pandemic in Togo, AI enabled by mobile data and satellite imagery was used to ensure the quick and efficient distribution of $22 million (in three monthly mobile phone payments of $20 for men and $22 for women) to 600,000 residents in urban areas.[106] This programme was made possible through a multi-stakeholder partnership between the Government of Togo, a philanthropic organization, and academia.

Recognizing and harnessing the transformative potential of AI in the public sector, while can have a significant impact in terms of delivering public value and ensuring inclusion. Just under half of the 138 countries responding to the 2022 MSQ indicate that they have a national AI strategy.[107] The breadth, depth and scope of the respective national AI strategies (including the role of AI in promoting inclusion) vary according to the objectives, expected outcomes and foreseeable impacts identified within each national context.

The trade-off between universality and targeting in policy development is often dictated by the availability of resources and the level of sustained effort required. When targeted services are integrated into a universal access strategy aimed at ensuring the provision of e-services for all, institutional coordination will be required at the policy design and implementation stages.

Web standards and assistive technologies

Given estimates that only 2 per cent of the 1.9 billion websites available globally are fully accessible to persons with disabilities, it is not surprising that most e-government portals are not fully accessible according to recommended standards.[108,109] The sizeable accessibility gap closes the most vulnerable off from many of the benefits and opportunities e-government offers.

Web accessibility entails designing for people on the periphery, including those who may have physical or sensory disabilities (such as impaired vision, hearing or motor skills), specific emotional challenges (such as anxiety) or different cognitive capacities.[110] Accessible websites may also benefit disadvantaged groups such as older persons or those with mobile-only or slow network connections. According to usability.gov, accessible sites use multisensory and multi-interactivity approaches that allow users to absorb digital content through multiple senses such as both sound and sight.[111] In Bangladesh, the Disability Innovation Lab was established through the Prime Minister's Office as a Service Innovation Fund project to support the creation, testing and commercialization of disability-inclusive products and e-services.[112] Accessible sites go beyond typical point-and-click services, integrating keyboard-based control and voice-based navigation tools.

The Internet technical community has recognized the importance of web accessibility since the first websites were developed in 1991, but this perspective has not been fully evident in e-government portal development. National portals that lack accessibility features will remain inaccessible for a significant share of the population. Inclusive design approaches that address accessibility imbalances have been enabled by technological advances over the past few decades, though it is generally acknowledged that creating accessible formats for some e-government services or types of disability may be technologically infeasible or impractical.

The United Nations E-Government Survey assesses the compliance of national portals with internationally recognized accessibility guidelines and relevant validity standards. Accessibility guidelines developed by W3C relate to web content, authoring tools and user agents. Version 2 of the Web Content Accessibility Guidelines (WCAG 2.0) stipulates that website content and interface components must be perceivable, operable, understandable and robust.[113] It is important that the design of e-government websites be optimized to ensure broad readability and usability—which means that certain criteria must be followed when developing and incorporating accessibility features for people with disabilities so that they are able to operate the interface and take full advantage of the evolving content. As seen in figure 4.17, 160 national portals (83 per cent of the 193 countries surveyed) are compliant with W3C markup validity standards, but only 75 countries (39 per cent) are in compliance with WCAG 2.0 guidelines. Even in Europe—the top EGDI performer—only 18 out of 43 countries are WCAG 2.0 compliant.

Figure 4.17   Regional compliance with W3C standards versus WCAG 2.0 guidelines
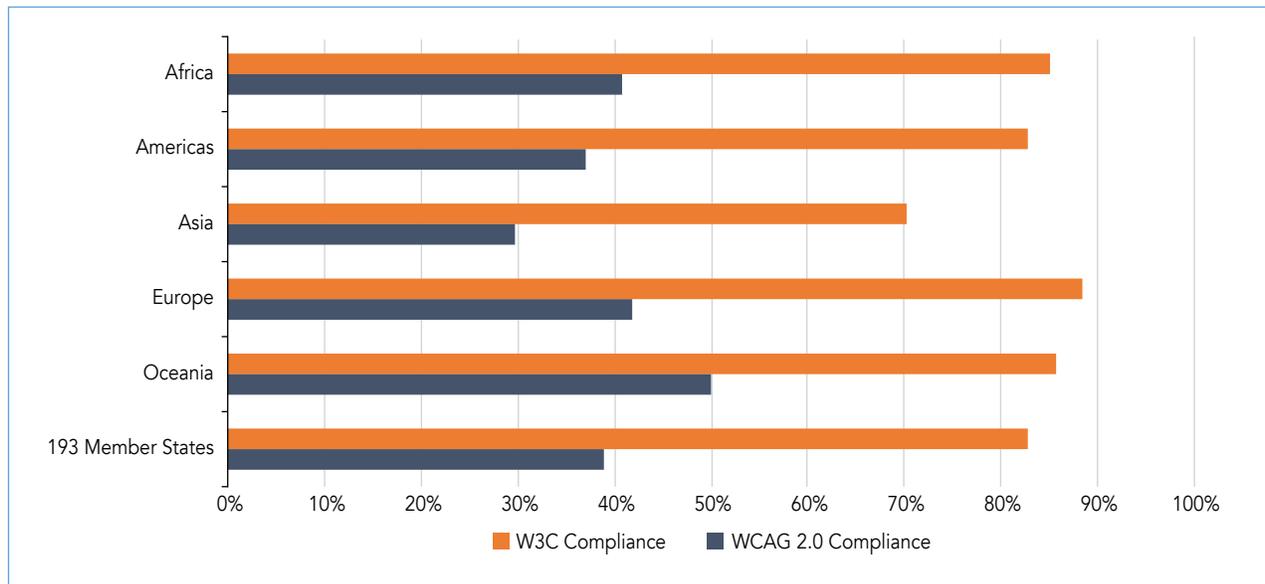
Responsive web design

E-government services are accessed through a variety of devices. The number of people browsing the Internet using mobile tools such as smartphones and other handheld devices now exceeds the number accessing the Internet from desktop computers. With approximately 60 per cent of organic search engine visits occurring on mobile devices, it is becoming increasingly important to make sure e-government portals are set up to provide a good user experience regardless of the type of device used. One particular challenge in designing mobile-specific apps relates to the existence of different mobile operating systems (such as Android, iOS and EMUI). This incompatibility among operating systems, coupled with the limited availability and affordability of Internet services and mobile devices, can limit the use of e-government services among vulnerable groups.

The best way to address this need is to build a responsive national portal—one that utilizes a flexible web design layout that adjusts based on screen size, ensuring that all images, content and functions look the same, regardless of the type of device used. Adherence to such web standards usually enhances a government portal's cross-browser compatibility, responsiveness to the performance parameters specific to each type of device, and the possibility for seamless integration and interaction across different platforms. (See Box 4.5) As seen in table 4.8, the number of countries that have integrated responsive web design in at least one of their national portals increased from 146 in 2020 to 170 in 2022.

Table 4.8   Number of national portals integrating responsive web design, 2018, 2020 and 2022

	Number of countries		
	2018	2020	2022
Number of countries integrating responsive web design in national portals	144 (74.6 per cent)	146 (75.6 per cent)	170 (88.1 per cent)

147

> **Box 4.5   United Kingdom: Increasing Accessibility by Implementing Standards**
>
> The United Kingdom's Digital Inclusion Strategy sets out how government and partners from the public, private and voluntary sectors could collaborate to help as many people as possible become capable of using and benefiting from the Internet. The accessibility standards that the government has adopted mean that public sector organizations are legally obliged to ensure their digital offerings (on mobiles, websites and applications) meet agreed accessibility standards. The Service Manual is a set of guidelines and standards to help service teams develop, build and maintain digital services that will meet the Service Standard and be allowed to live on GOV. UK. The Digital Inclusion Evaluation Toolkit is a collection of resources designed to help any organization assess the impact of a digital inclusion project. The toolkit aims to enable teams to provide evidence on how successful a project has been at implementing change and show how a project could be improved or iterated to increase its impact.

Assistive technologies

The use of assistive technologies in e-government services provision serves persons with disabilities as well as individuals who are "temporarily able-bodied" (those with no disabilities at present); at one time or another, virtually all users are likely to benefit from accommodations such as larger font sizes and text-to-speech or speech-to-text facilities.[114] Frontier technologies and the power of innovation offer tremendous opportunities for removing barriers for persons with disabilities and enhancing user experiences for those without disabilities. For instance, voice assistance with natural language recognition is a powerful enabler for assistive technology, but it can be used to empower all users—including but not limited to those with visual, hearing or motor disabilities—to engage productively in e-government and take advantage of the services offered. While the number of countries offering AI-enabled chatbox functionality in their e-government portals has increased significantly over the past several years, the total is still relatively low, accounting for just over a third of the 193 countries surveyed (see table 4.9).

Table 4.9   Number of countries providing AI-enabled chatbot functionality in their national portals, 2018, 2020 and 2022

	Number of countries		
	2018	2020	2022
Number of countries offering AI-enabled chatbot functionality in their national portals	28 (14.5 per cent)	58 (30.1 per cent)	69 (35.8 per cent)

Governments can also take advantage of other technologies and tools (including open software) designed to make the digital experience more accessible to persons with disabilities.[115] For example, a new search engine called accessFind can help persons with disabilities find websites that are accessible to them;[116] social media companies are experimenting with AI to help the visually impaired use their platforms;[117] and device manufacturers are expanding their screen-reading software and mobile apps.[118] Cloud computing has massive potential for the delivery of affordable and accessible services to older persons and persons with disabilities. Interoperability between assistive technologies and mainstream platforms has been a challenge but is one that may be overcome through cloud-based initiatives such as the Global Public Inclusive Infrastructure (GPII), which is supported by a consortium of academics, major tech companies, NGOs and individuals.[119] By offering users who

face accessibility barriers due to disability, illiteracy, digital illiteracy or ageing the ability "to invoke and use the access features they need anywhere, anytime, on any device",[120] initiatives such as GPII have the potential to significantly reduce the costs of assistive technologies for persons with disabilities across the world, especially in developing countries. There are also opportunities to tap into commercial technologies that are already familiar to users, such as Apple VoiceOver or Android TalkBack, when designing accessibility features in e-government portals.

There are some risks and potential disadvantages associated with assistive technologies; one research study showed, for example, that natural language processing models can perpetuate biases against persons with disabilities. There is a lot more work to be done to ensure that these technologies can be integrated seamlessly, ethically and inclusively in e-government services provision to enhance the lives of persons with disabilities. The burden of advocating for and facilitating accessibility has typically fallen on disabled persons themselves, and the default solution has often been to create special apps for persons with disabilities rather than making mainstream platforms accessible.

4.4.3 Delivery

In developing and delivering e-services for vulnerable groups, public authorities should be guided by the need for effectiveness, inclusiveness and accountability and by the core principle of leaving no one behind. Integrated efforts are required to ensure equitable access to digital services and information for everyone without bias or discrimination.[121] This subsection focuses on three approaches for improving services delivery: blended/omnichannel delivery (offline-online integration); local e-government and community network support for leaving no one behind; and pilots, experimentation and sandboxes.

Blended/omnichannel delivery

As emphasized throughout this chapter, vulnerable groups are left behind when they do not have the financial resources, access or ability to take advantage of e-government services. At the extreme end of the spectrum, a complete lack of digital access may require the use of "analogue" measures to reach those who are offline. For example, in the arid regions of northern Chad, where residents are completely cut off from Internet and digital and mobile phone services, the International Organization for Migration has engaged traditional town criers and troubadours to spread information about COVID-19.[122]

One recent trend involves offering blended or omnichannel e-services delivery, where integrated online and offline options are coordinated to provide a seamless experience for all users, including vulnerable groups. In blended e-government services delivery, the customer journey consists of a combination of online and offline touchpoints, where service agents are present digitally with shared data and synchronized services and customers can connect digitally, at home or through mobile delivery, or physically at strategically placed government services centres. The E-Government Survey indicates that there has been a gradual increase in recent years in the number of countries providing both online and offline channels through which residents can pay for public utilities and other e-services (see table 4.10).

Table 4.10   Number of countries with multichannel payment options for public utilities and other services, 2018, 2020 and 2022

	Number of countries		
	2018	2020	2022
Number of countries offering the option to pay for public utilities and other e-services via online and offline channels	131 (67.9 per cent)	133 (68.9 per cent)	143 (74.1 per cent)

Local and community networks and intermediaries

Across different parts of the world, people living in rural areas are less likely to use e-services than those residing in urban areas.[123] Many low-income countries are still underdeveloped and have large rural populations. Although digital coverage reaches many rural areas, geography and population density can make it economically unviable for telecommunications companies to set up the necessary infrastructure for all rural areas. Without coverage or network connectivity of sufficient quality, rural residents are likely to be excluded.

Empirical evidence indicates that local authorities are typically the best placed to understand and respond to the needs of the poorest and most vulnerable. They are also more likely to take a holistic approach to development (unlike national sectoral ministries) and are easier to hold accountable. However, expanded responsibilities require a corresponding expansion in resources, capacities and levels of authority; as this can take time, a carefully staggered approach is needed for the devolution of digital government responsibilities to local authorities. Fiscal reform and financial instruments may also be needed, as some authorities are in a position to mobilize resources, while others are not.

Issues can arise if local e-participation strategies are not carefully designed; one problem that may emerge is the dominance of vested interest groups and traditional elites.[124] This dynamic can make the voices of the vulnerable even harder to hear. To achieve balance, it is essential to exercise great care in the design and monitoring of such strategies, but it is also important to build the capacities of local authorities and civil society organizations and support social mobilization. From the outset, digital government agencies at both the local and national levels need to be fully representative of all the different segments of the population they serve. This is critical if the voices of the poorest and most vulnerable are to be truly heard.

The provision of targeted services at the individual and community levels is gaining traction, as is the targeting of socially disadvantaged groups through multiple channels. Research indicates that the most inclusive e-government practices are observed at the local or regional level. This reinforces the notion that efforts aimed at leaving no one behind are more effective if they are tied to a context-specific approach in which the geographical, physical, socioeconomic and cultural environments for specific target populations are taken into account.

To reach the poorest and most vulnerable populations, national and local government authorities may need to build partnerships with private sector entities and civil society organizations and engage with vulnerable groups through intermediaries or representatives that work more closely with these communities.[125] Non-governmental actors can play a complementary role, serving as government surrogates or proxies by delivering basic public services to disadvantaged communities where Governments are too weak, too far away or otherwise unable to provide such services.[126] Civil society organizations can also act as an invaluable conduit for communication, providing accurate information on the circumstances and needs of vulnerable populations.[127]

Governments will sometimes fund programmes and establish eligibility criteria but rely on NGOs or commercial entities for implementation. There is a need for robust legal, regulatory and fiscal frameworks that allow agility in certain kind of projects to support cooperative efforts aimed at leaving no one behind. Partnerships with NGOs and businesses require public institutions to be appropriately equipped and willing to work with non-State actors. Steps must be taken to ensure that all partners are actively engaged in policy implementation and decision-making and in identifying common or win-win goals. Efforts should be made to align incentives and build trust by, for example, initiating participatory dialogues or forming alliances with social movements and parliamentary committees or political parties. It is important to set up accountability mechanisms to produce meaningful results for the most vulnerable groups and the general public.

Pilots, experimentation and sandboxes

Sandboxes and experimentation are two relatively new approaches that have proven to be effective in creating a conducive, contained environment where Governments can partner with private sector and other relevant stakeholders to test technologies in a controlled space with a small sample group before launching them at scale — which allows them to dramatically reduce costs and limit the chances of failure and negative impacts.[128] Through sandboxing, experimentation, and collaboration with academia, think tanks, the private sector and civil society, Governments can better engage in systems thinking, examining the linkages and interactions that could best leverage the potential of digital government for leaving no one behind.

Experimentation and sandboxing can effectively capture the knowledge and perspectives of beneficiaries, produce a better understanding of the complex and less visible realities of excluded persons, and contribute to transformative change with fewer resources and reduced risks, but there are other solutions that promise faster gains. The minimal viable product approach is a development technique in which minimal resources are used to create a basic, rough, low-tech or low-fidelity prototype that is then tested in trials with selected groups of users. The potential for supporting vulnerable groups using this type of approach is largely untapped. In practice, this would involve running a small pilot test of how something might work, assessing the outcome, and making adjustments and improvements before broadening usage for the targeted group. This would require extensive research, analysis and follow-up, including deep inquiry to identify gaps and challenges, mapping user journeys through data collection and analysis, rapid prototyping through experimentation and minimum viable product testing, and final product development and delivery. It would be important to approach delivery holistically by contextualizing the nuances of the local community—including gender, cultural, religious and power dynamics—which would be possible only through more effective e-participation and e-engagement. Investing in sandboxes and minimal viable product approaches represents a solid strategic decision for policymakers, but it is important for institutions allow failures in pilots and experimentation, as the process of trial and error offers valuable learning opportunities.

Advances in AI and other technologies have made it possible to replicate complex, human-like computational abilities and interactivity, which may ultimately lead to a phasing out of traditional modes of public services delivery; while this shift is positive in many ways, it may also result in some vulnerable groups being left further behind. In digital government development, it is important to adopt data, design and delivery approaches that address the challenges and needs of all people, especially those who have historically been left behind (often as a result of deeply embedded intergenerational inequalities).

4.5 Policy messages

Global efforts to achieve sustainable development are being undermined by growing uncertainties and challenges deriving from economic volatility, stagnant growth, rising unemployment (especially among youth), increasing inequalities, chronic poverty and famine, ageing, migrant and refugee concerns, the effects of climate change, and unexpected crises such as the COVID-19 pandemic.[129] The overlapping and sheer relentlessness of these challenges can be overwhelming, and vulnerable groups are always disproportionately affected. Digital solutions can play a key role in moving society forward, but stopgap measures are not enough; it is vital that Governments adopt a comprehensive, deliberate and integrated approach to leaving no one behind in the hybrid digital society.

While all countries have expressed support for the 2030 Agenda and have pledged to leave no one behind, key questions remain about how to establish priorities and identify areas of urgent need and how to make pragmatic decisions and take action in contexts in which information is limited. While digital government has enjoyed political popularity, as it has given Governments a chance to deliver on promises of a better future, it has failed to live up to its full potential, as many people are still being left behind. There is a need for creative and inclusive approaches to e-government, with particular attention given to adopting forward-looking policies and regulations, developing innovative financing solutions, establishing strong and flexible infrastructure and content platforms, forming strategic partnerships, and establishing effective business models and accountability mechanisms in order to ensure that no one is left behind in the digital society.

4.5.1   Recognizing that the new face of inequality is digital

The new face of inequality is digital, and e-government can serve as an equalizer—but only if it is accessible to all members of society. The urgent need for digital inclusion is perhaps best illustrated by the circumstances surrounding the COVID-19 pandemic. During this period, digital government has increasingly replaced physical interactions and transactions between public institutions and people, so excluded communities have lacked support and access to crucial updates on the COVID-19 situation, leaving them more vulnerable to misinformation and the disease itself.

Those who are digitally included have easy access to government services and save time when using them. For government institutions, delivering services digitally is cheaper and more efficient. Inclusion in e-government means that all individuals are able to utilize digital platforms that optimize, automate and accelerate the provision of traditional public services. Digital inclusion is no longer a privilege; it is a necessity.

Support should be provided for vulnerable groups that are excluded from mainstream social protection programmes—and for the development of solutions that facilitate digital inclusion for these groups. Viet Nam offers incentives such as tax savings, concessional loans, and other support for the research, manufacture and production of products and services that enable persons with disabilities to access digital services. The country also does not impose import taxes on assistive devices for persons with disabilities.[130]

4.5.2   Identifying barriers linked to access, affordability and ability

The digital barriers faced by vulnerable groups are often complex and difficult to comprehend, in part due to the sparsity of relevant data. It is generally agreed, however, that e-government exclusion does not derive solely from the lack of Internet access.

A broader approach to assessing and addressing barriers to e-government focuses on access, affordability and ability. These indicators can be used not only to identify the extent of vulnerability and digital inclusion, but also to inform proactive preventive efforts and the development of targeted solutions. The availability of detailed data on digital access, affordability and ability can help developers address specific e-government design and implementation gaps and thereby increase overall utilization rates and user satisfaction. This is not a comprehensive strategy in and of itself, as Governments need to consider a multitude of other factors, including social norms, personal security, and privacy issues, in formulating policies for universal e-government access.

4.5.3 The integrated roles of data, design and delivery in shaping inclusive e-government

Leaving no one behind in e-government cannot be achieved by any one sector, institution or set of actions. Even when there are deliberate efforts to serve vulnerable groups, the lack of data and research, thoughtful design and inclusive delivery will result in the development of miscontextualized solutions and unscalable services. Leaving no one behind also requires complex coordination across ministries, departments and subsidiary entities, as digital initiatives are typically multifaceted; those relating to land development and social protection, for example, require multiple well-coordinated layers of input. Digital government should address than exacerbate existing structural inequalities.

The integrated e-government framework proposed in this chapter focuses on improving data, design and delivery (enablers) to address barriers relating to access, affordability and ability in order to ensure that no one is left behind (see figure 4.18). The data-design-delivery framework is dynamic, integrating the evolving tools and technologies of the digital age, and promotes thoughtful, evidence-based e-government development at all stages to ensure that public services are accessible, affordable and user-friendly for everyone in society.

While data, design and delivery each play an important role in shaping policy responses and digital government, these elements are meant to be addressed synergistically and not in isolation from one another. Governments using a combined approach can establish a solid path to inclusiveness, leveraging this integration to support collaboration across public institutions and sectors. This shared, intentional focus on three key priorities can help bring government agencies closer together, promoting greater alignment through, for example, the sharing of data, agreed design standards, and a common, integrated delivery platform. With a joint strategy for strengthening data, design and delivery, Governments can avoid silo approaches to e-government and will be better able to integrate and coordinate efforts among different sectoral agencies for the delivery e-government services to all segments of the population. This integrated approach must also be forward-looking so that actions taken now are designed to produce long-term benefits and prevent future digital gaps; examples might include investing in digital infrastructure in rural locations, building capacity in digital literacy, and providing vulnerable groups with the twenty-first century digital skills they will need for the jobs of the future.

Figure 4.18   An integrated framework for e-government: strengthening data, design and delivery (enablers) to address barriers relating to access, affordability and ability
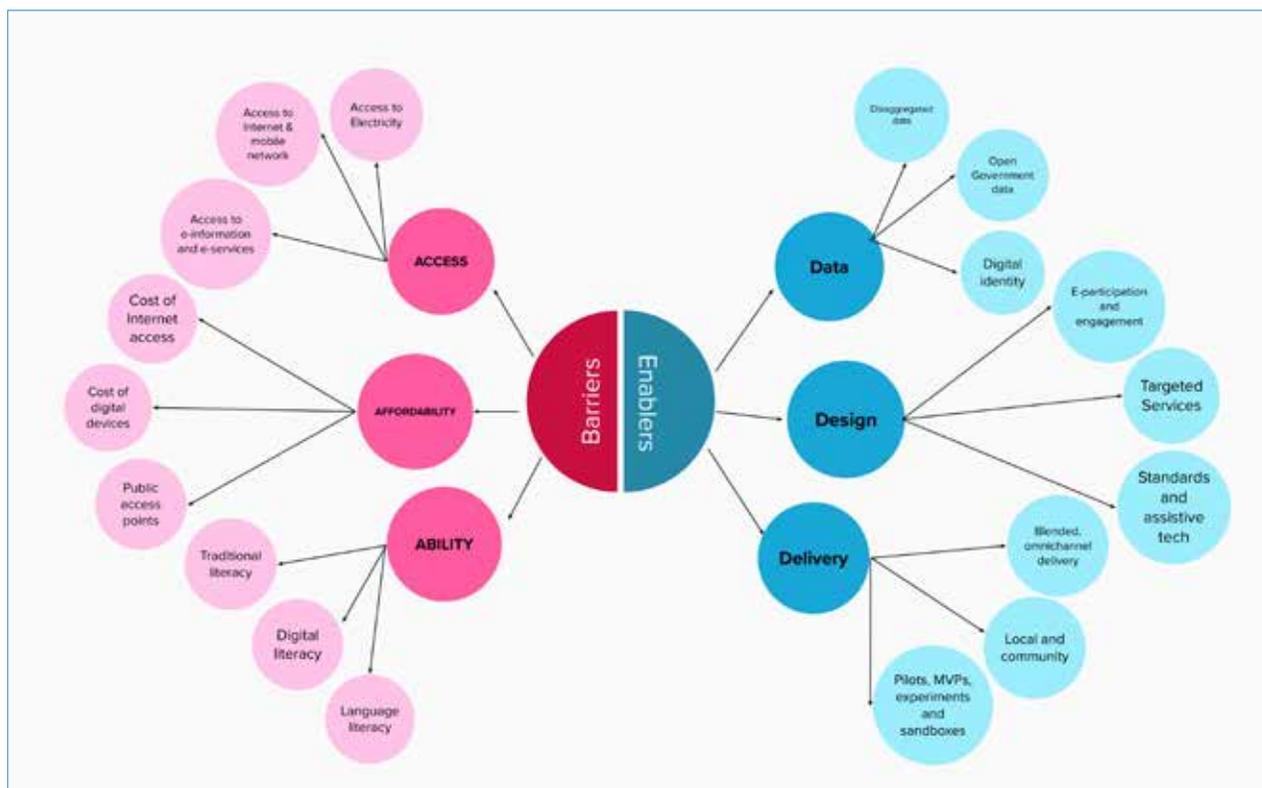
4.5.4   "Leaving no one behind" as the guiding principle for e-government development

Activating the integrated framework requires a well-developed policy framework supported by strong political leadership and the requisite resources. The policy component legitimizes and formalizes the data-design-delivery approach but is also meant to ensure that a strong institutional framework exists to provide ongoing support. The policy framework must reflect explicit recognition of the interlinkages between economic, social, environmental and cultural challenges and should support an institutional set-up that eschews the silo approach to policy and action and instead supports policy alignment and collaboration.[131] A strong, clear vision is required as a first step to support the broad strategy shift towards leaving no one behind in e-government. With that vision, Governments should focus on strengthening institutional capacity, ensuring greater transparency, and facilitating broad sectoral involvement in transitioning to full digital inclusion.

It is recommended that "leaving no one behind" become the operational principle guiding policy development and implementation in e-government and the public sector. At the policy and regulatory level, Governments should adopt "inclusion by design", "inclusion by default" or "inclusion first" strategies to counter the current default emphasis on "digital first" or "digital by default" strategies in e-government. As highlighted earlier, it is important for institutions to acknowledge diversity and recognize that exclusion exists as a prerequisite for activating the principle of leaving no one behind. While technology can be a catalyst for inclusive digital development, it is the combination of effective policy and institutional support that drive the digital transformation towards universal access for all. Policymakers can synchronize policy measures where linkages between various groups exist.[132] Inclusive e-government policies may focus on one or multiple barriers (access, affordability

and/or ability) that may shift over time and require appropriate adjustments in the areas of data, design and delivery. An integrated approach is necessary because there is a great deal of overlap and interdependence among the variables linked to barriers, enablers, e-government development, and leaving no one behind; for example, building digital ability is irrelevant if the required infrastructure is not available for a certain locality or community, and immigrant integration policies and programmes will likely need to be aligned with programmes and policies that address the public service needs of the general population.

A whole-of-government approach that integrates multilevel, multisectoral and multidisciplinary strategies and partnerships is needed for the implementation of inclusive digital government. Top-down and bottom-up approaches should be combined to better understand and address the e-government needs of the most vulnerable. Top-down legislative approaches impose direct obligations on those producing e-government products and services to ensure accessibility, and bottom-up policy approaches include non-discrimination guidelines that explicitly cover the accessibility of e-services. Steps should be taken to ensure that measures and policies adopted in one area do not undermine objectives in another area. For instance, e-government policies for micro, small and medium-sized enterprises need to be screened to ensure that they do not have a negative impact on the poorest and most vulnerable segments of society. This must be accompanied by a monitoring, evaluation and learning (MEL) framework.

Governments need to take the lead in driving the strategic shift towards leaving no one behind and in managing the change in mindset that will need to occur if this new approach is to gain traction. Some countries have set up a national agency to oversee the transformation process. For example, Malaysia has established a digital inclusion council;[133] over time, as digital inclusion grows, this council may shift its focus to loftier goals such as national digital readiness, similar to the Smart Nation initiative in Singapore.[134] Some countries have implemented targeted policy and institutional reforms and measures to address the limited participation of youth in policymaking; the Republic of Korea, for example, has created a national youth congress and has adopted legislation aimed at giving youth a voice in the public discourse.[135] Enhanced youth engagement opens the door to increased involvement in policy discussions and input, which can in turn strengthen the responsiveness of Governments to the needs of youth in the development and delivery of public services.[136]

Finally, there is a need to mobilize resources, build capacities, create sustainable financing frameworks, and leverage national research and innovation agendas to achieve universal digital inclusion so that no one is left behind. The task of ensuring that adequate financial, political and human resources are available to meet these overarching goals can be shared by local and national governments, and regional or global support may be available as well. Activating "digital inclusion by design" and "leaving no one behind" strategies requires that policy choices be made sooner rather than later to remove the barriers vulnerable groups face in terms of digital access, affordability and ability using the integrated framework for optimizing data, design and delivery. Without these policy goals and interventions, leaving no one behind will enjoy limited or uneven success—or remain in the realm of rhetoric.

4.5.5   Leaving no country behind in e-government

The challenges associated with advancing e-government are normally more acute and persistent for countries in special situations, including LDCs, LLDCs, SIDS and countries in post-conflict situations. Low productive capacity and structural insufficiencies such as the lack of digital infrastructure and limited access to technologies continue to challenge public institutions in such areas. These countries are often disproportionally impacted by global crises such as the COVID-19 pandemic, and the increasing effects of climate change also place burdens on public institutions. The geographical constraints of LLDCs result in greater dependence on bordering countries for trade and infrastructure development. For SIDS, intracountry and inter-community isolation hinders the flow of information

and public services, which also poses challenges for public institutions. Countries in post-conflict and post-disaster situations face enormous challenges at multiple levels that can undermine progress towards the SDGs and put them at risk of being left behind. Most countries emerging from conflict do not have sufficient capacity to rebuild public administration through digital transformation. The critical lack of resources and "brain drain" (human capital flight) are compounded by the absence of public trust in government.

Most of this chapter has focused on the digital exclusion of vulnerable population groups, but as the foregoing illustrates, being left behind is a risk that may be faced at the whole-country level as well. This is significant, as while Governments with sufficient resources can pursue digital inclusion strategies by shifting priorities and changing mindsets, vulnerable countries lack the basic foundations for pursuing digital development, even if the will is there. Just as no one should be left behind, so should no country be left behind; therefore, special attention must be given to the profound challenges faced by public institutions in countries in special situations. There is a need for more international support, including through South-South and triangular cooperation. While countries in special situations face some unique challenges, there are many common challenges and strategic objectives they share with the rest of the world. Many opportunities lie ahead for enhancing partnerships and capacity-building and for strengthening international and regional cooperation aimed at leveraging advancements in digital government to achieve the development objectives embodied by the SDGs.

Bilateral and multilateral collaboration can facilitate knowledge sharing, policy alignment, and the transfer and replication of best practices. Collaboration at the global and regional levels has led to important advances in e-government development and coordination and has strengthened the contribution of digital government to sustainable development. Collaboration takes many forms and can be initiated at multiple levels. Some collaborative efforts and partnerships have been facilitated by the United Nations Department of Economic and Social Affairs and other agencies through mechanisms such as the Internet Governance Forum, the Multi-stakeholder Forum on Science, Technology and Innovation for the SDGs (STI Forum), and the World Summit on the Information Society (with special attention given to the implementation of action lines, including ICT applications relating to e-government, e-health, e-learning and other key areas).[137] Other collaborative structures have been created by individual countries; Singapore, for example, initiated the Digital Government Exchange, which brings together CIOs and digital government leaders from around the world.[138] The expansion of existing partnerships and the launching of new partnerships with international organizations, regional development banks, and individual developed countries are needed to mobilize financial and human resources for more strategic ICT and e-government development to ensure that no country is left behind.[139]

4.6   Conclusion

In the hybrid digital society, digital development and inclusion are important, but they are part of the broader framework for sustainable development and not end goals in and of themselves. While technology can be a transformative factor in serving the most vulnerable groups, addressing the deeper, interlinked problems of the digital age will require solutions that extend far beyond digital technologies. It will take time to achieve the cultural shifts and digital mindset needed to take optimal advantage of e-government and other digital offerings. For many reasons, the digital component of e-government should be complemented by analogue approaches such as hotlines, call centres, in-person service centres, and even house visits so that no one is excluded.

One of the key lessons learned during the COVID-19 pandemic is that the future is hybrid and not digital; in other words, the primary objective is not digital development but rather supporting human development through digitalization. Without this distinction, there is a risk of dehumanizing society through technology, as exemplified by the replication of more human-like public services through

rapid advances in AI. It is important for Governments to keep sight of the fact that advances in technology and e-government must ultimately serve the wider goal of supporting sustainable human development—and leaving no one behind. Digital government services will never fully replace human interaction; in inclusive e-government, technologies should not constitute the only channel of communication—even if all barriers relating to access, affordability and ability have been eliminated. Policy decisions that affect humanity should continue to be made by humans, with e-government accountability given careful consideration.

There are policy dilemmas that may arise in the process of e-government development that reflect genuine concerns about how far countries should go to achieve universal digital inclusion and the defining goal of leaving no one behind. To what extent should countries pursue e-government for all, and how does this tie in with ensuring equitable social progress among the bottom 1 per cent of the population? Given that facilitating e-participation and digital inclusion are time-intensive and resource-intensive processes, how can Governments measure returns on investment and try to strike a sustainable balance in efforts to improve the overall efficacy of public services delivery and SDG implementation and strengthen the engagement of vulnerable segments of the population? There are no easy answers to the complex questions and issues that will arise as Governments commit to the pursuit of universal digital inclusion. Careful deliberation will be required, and solutions will need to be tailored to specific local needs, contexts and circumstances, but what is most important is to not lose sight of the overarching goal of leaving no one behind in the hybrid digital society.

Endnotes

1   United Nations, Economic and Social Council, conference room paper on eradicating poverty and promoting prosperity while leaving no one behind: implications for public administration, prepared for the sixteenth session of the United Nations Committee of Experts on Public Administration, held in New York from 24 to 28 April 2017.

2   United Nations Economic and Social Council, contribution by the United Nations Committee of Experts on Public Administration to the thematic review of progress on the SDGs at the 2016 High-level Political Forum on Sustainable Development.

3   United Nations, "UN/DESA Policy Brief #61—COVID-19: embracing digital government during the pandemic and beyond", 14 April 2020, available at https://www.un.org/development/desa/dpad/publication/un-desa-policy-brief-61-covid-19-embracing-digital-government-during-the-pandemic-and-beyond/.

4   Long Yang and others, "Mobile Internet use and multidimensional poverty: evidence from a household survey in rural China" Social Indicators Research, vol. 158 (2021), pp. 1,065-1,086, available at https://doi.org/10.1007/s11205-021-02736-1.

5   United Nations, United Nations *E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development* (Sales No. E.20.II.H.1), available at https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020.

6   Kevin Watkins, "Leaving no one behind: an agenda for equity", Lancet, vol. 384, No. 9961 (20 December 2014), pp. 2,248-2,255, available at https://doi.org/10.1016/S0140-6736(13)62421-6.

7   United Nations, Economic and Social Council, conference room paper on eradicating poverty and promoting prosperity while leaving no one behind: implications for public administration, prepared for the sixteenth session of the United Nations Committee of Experts on Public Administration, held in New York from 24 to 28 April 2017.

8   See chapters 1 and 2 of the present publication.

9   Soumya Chattopadhyay and Heiner Salomon, "Leave no one behind' indices 2020", ODI working papers, 26 April 2021, available at https://odi.org.en/publications/leave-no-one-behind-indices-2020/.

10 See the methodology section on MSQs and OSQs.

11 United Nations Economic and Social Council, "Background note on challenges for institutions in ensuring that no one is left behind: draft contribution by the Committee of Experts on Public Administration to the 2016 thematic review of the High-Level Forum on Sustainable Development", prepared for the fifteenth session of the United Nations Committee on Public Administration, held in New York from 18 to 22 April 2016.

12   United Nations, "Transforming our world: the 2030 Agenda for Sustainable Development" (A/RES/70/1), available at https://sustainabledevelopment.un.org/post2015/transformingourworld.

13   Kate Donald and Nicholas Lusiani, *From Disparity to Dignity: Tackling Economic Inequality through the Sustainable Development Goals*, Policy Brief (New York, Center for Economic and Social Rights, 2016), available at https://www.cesr.org/disparity-dignity-inequality-and-sdgs/.

14   Pew Research Center, "Smartphone Ownership and Internet Usage Continues to Climb in Emerging Economies", February 2016.

15   United Nations, Economic and Social Council, conference room paper on eradicating poverty and promoting prosperity while leaving no one behind: implications for public administration, prepared for the sixteenth session of the United Nations Committee of Experts on Public Administration, held in New York from 24 to 28 April 2017.

16   Michiel S. de Vries, "How can public policies solve social problems?", in *Understanding Public Administration* (London, Palgrave Macmillan, 2016)

17   International Telecommunication Union, *Measuring Digital Development: Facts and Figures 2021* (Geneva, 2021), available at https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx.

18   Sabhanaz Rashid Diya, "The future of digital is human", The Daily Star, 16 January 2020, available at https://www.thedailystar.net/opinion/perspective/news/the-future-digital-human-1854616.

19   Isabelle Carboni and others, *Connected Women: The Mobile Gender Gap Report 2021* (London, GSM Association, 2021), available at https://www.gsma.com/r/gender-gap/.

20   World Wide Web Foundation, "Women's rights online: closing the digital gender gap for a more equal world", 12 October 2020, available at https://webfoundation.org/research/womens-rights-online-2020/.

21   United Nations Development Programme, "Gender Inequality Index (GII)", Human Development Reports (2020), available at https://hdr.undp.org/en/content/gender-inequality-index-gii.

22   See the 2022 Member States Questionnaire results.

23   United Nations Department of Economic and Social Affairs, 2022 Member States Questionnaire.

24   Andrew Sixsmith, Alex Mihailidis and Dorina Simeonov, "Aging and technology: taking the research into the real world", Public Policy and Aging Report, vol. 27, No. 2 (2017), pp. 74-78.

25   ConvenienceStore News, "Digital seniors & rural urbanites are among the top 10 global customer trends for 2022", section 3 on the Business Outlook for Digital Seniors, 20 January 2022.

26   Andrew Sixsmith and Gloria Gutman, eds., *Technologies for Active Aging* (New York, Springer, 2013).

27   United Nations, *World Public Sector Report 2018—Working Together: Integration, Institutions and the Sustainable Development Goals* (Sales No. E.18.II.H.1), chapter 6 on integrated approaches to health and well-being, available at https://publicadministration.un.org/publications/content/featured_titles/world_public_sector_rep_2018.html; see also https://www.researchgate.net/publication/281335476_Technology_and_the_Challenge_of_Aging.

28   United Nations, *Disability and Development Report: Realizing the Sustainable Development Goals by, for and with Persons with Disabilities* (Sales No. 19.IV.4), available at https://www.un.org/development/desa/dspd/2019/04/un-disability-and-development-report-realizing-the-sdgs-by-for-and-with-persons-with-disabilities/.

29   Centre for Internet and Society and Global Initiative for Inclusive Information and Communication Technologies, *Web Accessibility Policy Making: An International Perspective* (2012), available for download at http://cis-india.org/accessibility/web-accessibility-policy-making-an-international-perspective.

30   United Nations Disability Inclusion Strategy.

31   United Nations, *Our Common Agenda: Report of the Secretary-General* (Sales No. E.21.I.8), para. 50, available at https://www.un.org/en/content/common-agenda-report/#download.

32   United Nations, *World Public Sector Report 2018—Working Together: Integration, Institutions and the Sustainable Development Goals* (Sales No. E.18.II.H.1), available at https://publicadministration.un.org/publications/content/featured_titles/world_public_sector_rep_2018.html.

33   Khorshed Alam and Sophia Imran, "The digital divide and social inclusions among refugee migrants: a case in regional Australia", *Information Technology and People*, vol. 28, No. 2 (2015); see https://www.researchgate.net/publication/273003145_The_Digital_Divide_and_Social_Inclusion_among_Refugee_Migrants_A_Case_in_Regional_Australia.

34   Ibid.

35   United Nations, "Report of the Expert Group Meeting on Integrated Approaches to International Migrations: the Perspective of Public Institutions and Public Administration" (2017); meeting organized by the United Nations Division for Public Institutions and Digital Government.

36   International Organization for Migration, "IOM steps up risk communication and community engagement in response to COVID-19 in West and Central Africa", news update (Dakar, 21 April 2020), available at https://www.iom.int/news/iom-steps-up-risk-communication-and-community-engagement-response-covid-19-west-and-central-africa.

37   Simon Collin, Thierry Karsenti and Olivier Calonne, "Migrants' use of technologies: an overview of research objects in the field", *Journal of Technologies and Human Usability*, vol. 10, Nos. 3-4, pp. 15-29.

38   Margarida Rodrigues, "Can digital technologies help reduce the immigrant-native educational achievement gap?", JRC Working Papers (Seville, Joint Research Centre, 2018).

39   United Nations, *United Nations E-Government Survey 2018: Gearing E-Government to Support Transformation towards Sustainable and Resilient Societies* (Sales No. E.18.II.H.2), available at https://publicadministration.un.org/en/research/un-e-government-surveys.

40   United Nations, Economic and Social Council, conference room paper on eradicating poverty and promoting prosperity while leaving no one behind: implications for public administration, prepared for the sixteenth session of the United Nations Committee of Experts on Public Administration, held in New York from 24 to 28 April 2017.

41   Lizzie Iron and Christie Silk, *Access for All: The Importance of Inclusive Services* (London, Myddleton House, Citizens Advice Bureau Services, 2011).

42   Ellen J. Helsper, *The Digital Disconnect: The Social Causes and Consequences of Digital Inequalities* (London, Sage Publications Ltd., 2021).

43   Niki Rodousakis and Antonio Mendes dos Santos, "The development of inclusive e-government in Austria and Portugal: a comparison of two success stories, *Innovation: The European Journal of Social Science Research*, vol. 21, No. 4, pp. 283-316, available at https://doi.org/10.1080/13511610802591892.

44   Chalaby, "Rural women are a quarter of the global population—but ignored by policy", apolitical website post, analysis / gender and equality (1 March 2018), available at https://apolitical.co/solution-articles/en/rural-women-quarter-global-population-ignored-policy.

45   Ellen J. Helsper, *The Digital Disconnect: The Social Causes and Consequences of Digital Inequalities* (London, Sage Publications Ltd., 2021).

46   John Low, Damien DuJacquier and Sulina Kaur, *Focus—Bridging the Digital Divide: Improving Digital Inclusion in Southeast Asia* (Munich, Roland Berger GMBH, 2021), available at https://www.rolandberger.com/en/Insights/Publications/Bridging-the-digital-divide.html.

47   Julian Thomas and others, *Australian Digital Inclusion Index: 2021* (Melbourne, RMIT, Swinburne University of Technology and Telstra, 2021).

48   Tony Roberts, "Digital technologies exclude", Making All Voices Count blog post, 2 May 2017, available at https://www.makingallvoicescount.org/blog/digital-technologies-exclude/.

49   United States, Cybersecurity and Infrastructure Security Agency, Guidance on the Essential Critical Infrastructure Workforce (relating to the COVID-19 response), available at https://www.cisa.gov/publication/guidance-essential-critical-infrastructure-workforce.

50   Nilmini Rubin, "Without energy, the Internet is just a black hole: creating energy solutions for information and communications technology", Alliance for Affordable Internet blog post, 2 May 2017, available at http://a4ai.org/without-energy-the-internet-is-just-a-black-hole-creating-energy-solutions-for-information-and-communications-technology/; and Anna Lerner, Roku Fukui and Doyle Gallegos, "Electricity and the Internet: two markets, one big opportunity", World Bank Blogs post, 25 may 2017, available at https://blogs.worldbank.org/digital-development/electricity-and-internet-two-markets-one-big-opportunity.

51   Georges V. Houngbonon, Erwan Le Quentrec and Stefania Rubrichi, "Access to electricity and digital inclusion: evidence from mobile call detail records", *Humanities and Social Science Communications*, vol. 8, article No. 170 (2021), available at https://doi.org/10.1057/s41599-021-00848-0.

52   United Nations, *Sustainable Development Goals Report 2021* (Sales No. E.21.I.3), p. 45, available at chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf.

53   International Energy Agency and others, *The Energy Progress Report*, Tracking SDG 7, available at http://trackingSDG7.esmap.org/.

54   International Telecommunication Union, *Measuring Digital Development: Facts and Figures 2021* (Geneva, 2021), available at https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx

55   United Nations, Internet Governance Forum, "Policy Network on Meaningful Access (PNMA)", available at https://www.intgovforum.org/multilingual/content/policy-network-on-meaningful-access-pnma.

56   Anne Delaporte and Kalvin Bahia, *The State of Mobile Internet Connectivity 2021* (London, GSM Association, 2021), available at https://www.gsma.com/r/wp-content/uploads/2021/09/The-State-of-Mobile-Internet-Connectivity-Report-2021.pdf.

57   United Nations, *Sustainable Development Goals Report 2021* (Sales No. E.21.I.3), p. 45, available at chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf.

58   Anna Read and Lily Gong, "States Considering Range of Options to Bring Broadband to Rural America", Pew Research Center, 29 March 2022, available at: https://www.pewtrusts.org/en/research-and-analysis/articles/2022/03/29/states-considering-range-of-options-to-bring-broadband-to-rural-america

59   World Wide Web Foundation, "Meaningful connectivity: a new measure for Internet access", news and blogs (28 February 2022), available at https://webfoundation.org/2022/02/meaningful-connectivity-a-new-measure-for-internet-access/.

60   Internet Society, "Internet accessibility: Internet use by persons with disabilities: moving forward", Growing the Internet (1 November 2012), available at https://www.internetsociety.org/resources/doc/2012/internet-accessibility-internet-use-by-persons-with-disabilities-moving-forward/.

61   Legal Monitor Worldwide, "Pandemic highlights importance of broadband access" (24 April 2020), available at https://link.gale.com/apps/doc/A621780936/ITOF?u=ull_ttda&sid=ITOF&xid=78eb3f7d.

62   Giga website, available at https://gigaconnect.org/.

63   International Federation of Library Associations and Institutions, "Every Community Connected: a call to action, a pledge to engage" (16 October 2020), available at https://www.ifla.org/news/every-community-connected-a-call-to-action-a-pledge-to-engage/.

64   Teddy Woodhouse, Sustainable, *Universal Access to the Internet: Environmental Implications and Policy Choices*, Lisa van Wyk, ed. (Alliance for Affordable Internet, 2021), available at https://a4ai.org/research/sustainable-access-report/.

65   Alliance for Affordable Internet, *A4AI Affordability Report 2018*, available at https://a4ai.org/affordability-report/report/2018//.

66   Masha Zager, "Municipal fiber in Sweden", *Broadband Communities magazine* (November/December 2019), available at https://www.bbcmag.com/community-broadband/municipal-fiber-in-sweden.

67   UNESCO, 2021.

68   International Telecommunication Union, *Measuring Digital Development: Facts and Figures 2021* (Geneva, 2021), available at https://www.itu.int/en/ITU-D/Statistics/Pages/facts/default.aspx; see also https://www.itu.int/itu-d/reports/statistics/facts-figures-2021/.

69   Stephen R. Anderson, "How many languages are there in the world?" Brochure Series (Washington, D.C., Linguistic Society of America, 2010), available at https://www.linguisticsociety.org/content/how-many-languages-are-there-world.

70   Maggie Fick and Paresh Dave, "Facebook's flood of languages leave it struggling to monitor content", Reuters, 23 April 2019, available at https://www.reuters.com/article/us-facebook-languages-insight/facebooks-flood-of-languages-leave-it-struggling-to-monitor-content-idUSKCN1RZ0DW.

71   Marcel Diki-Kidiri, *Securing a Place for Language in Cyberspace* (CI.2007/WS/1) (Paris, United Nations Educational, Scientific and Cultural Organization, 2008), available at https://unesdoc.unesco.org/ark:/48223/pf0000149786_eng.

72   Miguel Trancozo Trevino, "The many languages missing from the Internet" BBC, 15 April 2020, available at https://www.bbc.com/future/article/20200414-the-many-lanuages-still-missing-from-the-internet.

73   "The true meaning of leaving no one behind", *The Lancet Global Health, editorial*, vol. 7, No. 5 (1 May 2019), p. e533, available at DOI:https://doi.org/10.1016/S2214-109X(19)30176-7.

74   United Nations, "Using technology for multilingual learning: challenges and opportunities", International Mother Language Day, 21 February 2022, observances/announcements, available at https://www.un.org/en/observances/mother-language-day.

75   United Nations, "Using technology for multilingual learning: challenges and opportunities", International Mother Language Day 2022, 21 February 2022, UN Web TV clip, available at https://media.un.org/en/asset/k1t/k1t0k5i4sm.

76   Iman Ghosh, 2021. All World Languages in One Visualization https://www.visualcapitalist.com/a-world-of-languages/

77   African Academy of Sciences, "Mobility schemes: Science and Language Mobility Scheme Africa", available at https://www.aasciences.africa/aesa/programmes/mobility-schemes-science-and-language-mobility-scheme-africa.

78   United Nations, Internet Government Forum, "IGF 2020 WS #271 multilingualism online: old challenges and new perspectives", session summary (2020), available at https://www.intgovforum.org/multilingual/content/igf-2020-ws-271-multilingualism-online-old-challenges-and-new-perspectives#undefined.

79 United Nations, Department of Economic and Social Affairs, *Indicators and a Monitoring Framework for the Sustainable Development Goals: Launching a Data Revolution* (Leadership Council Sustainable Development Solutions Network, 12 June 2015), p. 97, available for download at https://sdgs.un.org/publications/indicators-and-monitoring-framework-sustainable-development-goals-17958.

80 UNESCO, Leibniz Institute for Media Research and Hans-Bredow-Institut, "Assessing Internet development in Germany: using UNESCO's Internet Universality ROAM-X Indicators; executive summary", programme and meeting document (CI-2021/WS/3) (2021).

81 United Nations, "Transforming our world: the 2030 Agenda for Sustainable Development" (A/RES/70/1 para 48), available at https://sustainabledevelopment.un.org/post2015/transformingourworld.

82 Alex Cobham, "Uncounted: power, inequalities and the post-2015 data revolution", guest editorial, *Development*, vol. 57, No. 3 (December 2014), pp. 320-337.

83 United Nations, "Transforming our world: the 2030 Agenda for Sustainable Development" (A/RES/70/1 para.48), available at https://sustainabledevelopment.un.org/post2015/transformingourworld.

84 United Nations, High-level Group for Partnership, Coordination and Capacity-Building for Statistics for the 2030 Agenda for Sustainable Development, Cape Town Global Action Plan for Sustainable Development Data, launched 15 January 2017, p. 2, available at https://unstats.un.org/sdgs/hlg/Cape_Town_Global_Action_Plan_for_Sustainable_Development_Data.pdf.

85 Alison Holder, Maricar Garde and Jessica Espey, *A Fair Chance at Life: Why Equity Matters for Child Mortality* (London, International Save the Children Alliance, 2010), available at http://www.savethechildren.org.uk/sites/default/files/docs/A_Fair_Chance_at_Life_1.pdf.

86 Asian Development Bank, *Practical Guidebook on Data Disaggregation for the Sustainable Development Goals* (May 2021), available at http://dx.doi.org/10.22617/TIM210117-2.

87 Note: See definition of OGD in UN E-Government Survey 2020

88 United Nations, United Nations *E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development* (Sales No. E.20.II.H.1), chap. 6: "Towards data-centric e-government", available at https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020.

89 United Nations, Office of the Secretary-General's Envoy on Youth, "Statistical Commission adds last piece for full implementation of SDGs" (2017), available at http://www.un.org/youthenvoy/2017/03/statistical-commission-adds-last-piece-full-implementation-sdgs/.

90 Vyjayanti T. Desai, "Making the invisible billion more visible: the power of digital identification", World Bank Blogs, 22 February 2016, available at http://blogs.worldbank.org/ic4d/making-invisible-billion-more-visible-power-digital-identification.

91 World Bank, "Financial Inclusion - Financial inclusion is a key enabler to reducing poverty and boosting prosperity", available at https://www.worldbank.org/en/topic/financialinclusion/overview

92 United Nations, *Report on the World Social Situation 2016—Leaving No One Behind: The Imperative of Inclusive Development* (Sales No. E.16.IV.1), available at https://www.un.org/development/desa/publications/report-of-the-world-social-situation-2016.html#:~:text=The%202016%20Report%20on%20the,%2C%20ethnic%20minorities%2C%20indigenous%20peoples%2C.

93 Kat Holmes, *Mismatch: How Inclusion Shapes Design* (Cambridge, Massachusetts, MIT Press, 2020).

94 Commonwealth Local Government Forum, "Need to promote inclusivity in local government says CLGF SG", 13 October 2016, available at http://www.clgf.org.uk/whats-new/news/need-to-promote-inclusivity-in-local-government-says-clgf-sg/.

95 Michiel S. de Vries, "How can public policies solve social problems?", chapter 8 in *Understanding Public Administration* (Palgrave Macmillan, 2016), p. 197.

96 United Nations, *United Nations E-Government Survey 2018: Gearing E-Government to Support Transformation towards Sustainable and Resilient Societies* (Sales No. E.18.II.H.2), executive summary, available at https://publicadministration.un.org/en/research/un-e-government-surveys. Executive Summary.

97 United Nations, United Nations *E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development* (Sales No. E.20.II.H.1), chap. 5: "E-participation", available at https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020.

98 Naveed Haq, Promoting digital accessibility: for persons with disabilities, with persons with disabilities", Internet Society blog post, 13 February 2017, available at https://www.internetsociety.org/blog/2017/02/promoting-digital-accessibility-for-persons-with-disabilities-with-persons-with-disabilities/.

99 Adopted in 2018 as key component 7 of the Digital Pakistan Policy, available at http://moib.gov.pk/Downloads/Policy/DIGITAL_PAKISTAN_POLICY(22-05-2018).pdf.

100 Alliance for Affordable Internet, "Building inclusive Universal Service and Access Fund (USAF) projects", available at https://a4ai.org/studies/building-inclusive-universal-service-and-access-fund-usaf-projects/.

101 Isabelle Carboni and others, *Connected Women: The Mobile Gender Gap Report 2021* (London, GSM Association, 2021), available at https://www.gsma.com/r/gender-gap/.

102 Amelia Bleeker, *Using Universal Service Funds to Access Technology for Persons with Disabilities in the Caribbean*, Studies and Perspectives Series, No. 79 (LC/CAR/TS.2019/2) (Santiago, Economic Commission for Latin America and the Caribbean, 2019), available at https://repositorio.cepal.org/bitstream/handle/11362/44913/1/S1900752_en.pdf.

103 United Nations, Internet Governance Forum, "UN Secretary-General remarks to the IGF 2019".

104 Christian Kuran, et al., "Vulnerability and vulnerable groups from an intersectionality perspective", International Journal of Disaster Risk Reduction, Vol 50, 2020.

105 Capgemini Consulting, "Unleashing the potential of artificial intelligence in the public sector" (2017).

106 Malaka Gharib, "The pandemic pushed this farmer Into deep poverty. Then something amazing happened", available at https://www.npr.org/sections/goatsandsoda/2021/02/15/966848542/the-pandemic-pushed-this-farmer-into-deep-poverty-then-something-amazing-happene.

107 See the 2022 Member States Questionnaires.

108 Pia Singh, "Internet is far from being accessible for all people with disabilities, accessiBe says", CNBC, 29 July 2021.

109 Internet Live Stats, Internet users in the world and total number of websites, accessed in 2022, available at https://www.internetlivestats.com/.

110 Yale University, "Types of disabilities", Usability & Web Accessibility page, available at https://usability.yale.edu/web-accessibility/articles/types-disabilities.

111 Usability.gov is a public resource established by the United States General Services Administration's Technology Transformation Service to share user experience best practices and guidelines with the aim of making digital content more usable and useful for all; see the "about us" and "accessibility basics" sections of the website, available at https://www.usability.gov/.

112 Bangladesh, Access to Information (A2i) Program, "Innovation Lab is changing the scenario" (accessed in 2022), available at https://a2i.gov.bd/innovation-lab/#1509873205931-2079cb0c-4eac.

113 W3C, Web Content Accessibility Guidelines (WCAG) 2.0, W3C Recommendation, available at https://www.w3.org/TR/WCAG20/.

114 Kat Holmes, *Mismatch: How Inclusion Shapes Design* (Cambridge, Massachusetts, MIT Press, 2020).

115 Andrew Perrin and Sara Atske, "Americans with disabilities less likely than those without to own some digital devices" (Pew Research Center, 10 September 2021), available at https://www.pewresearch.org/fact-tank/2021/09/10/americans-with-disabilities-less-likely-than-those-without-to-own-some-digital-devices.

116 Ernest Hamilton, "AccessiBe's search engine accessFind is launched to help those with disabilities find accessible websites", *Tech Times*, 14 June 2021, available at https://www.techtimes.com/articles/261437/20210614/accessibes-search-engine-accessfind-is-launched-to-help-those-with-disabilities-find-accessible-websites.htm.

117 Meta, "Using AI to improve photo descriptions for people who are blind and visually impaired" (19 January 2021), available at https://about.fb.com/news/2021/01/using-ai-to-improve-photo-descriptions-for-blind-and-visually-impaired-people/.

118 C. Low, "Accessibility in tech improved in 2020, but more must be done. How did the industry's biggest companies perform?" Engadget website, 23 December 2020, available at https://www.engadget.com/accessibility-in-tech-2020-150002855.html.

119 Global Public Inclusive Infrastructure, website available at https://gpii.net/.

120 Scott Hollier, "The growing importance of accessible social media", in *Disability and Social Media: Global Perspectives*, Katie Ellis and Mike Kent, eds. (London and New York, Routledge, 2017), p. 84.

121 United Nations, Committee of Experts on Public Administration, "Contribution to the 2016 thematic review of the High-level Political Forum (HLPF)", 15 April 2016, fifteenth session of the United Nations Committee of Experts on Public Administration, New York, 18-22 April 2016.

122 International Organization for Migration, "Town criers, troubadors raise COVID-19 awareness in rural Chad", news-global, 24 April 2020, available at https://www.iom.int/news/town-criers-troubadors-raise-covid-19-awareness-rural-chad.

123 Organization for Economic Cooperation and Development, "Figure 3.7. The gap in high-speed Internet access between urban and rural areas is large in many OECD countries", in *How's Life? 2020: Measuring Well-being*, available at https://www.oecd-ilibrary.org/sites/9870c393-en/1/3/3/index.html?itemId=/content/publication/9870c393-en&_csp_=fab41822851fa020ad60bb57bb82180a&itemIGO=oecd&itemContentType=book#figure-d1e6473; Alliance for Affordable Internet, Rural Broadband Policy Framework, available at https://a4ai.org/rural-broadband-policy-framework/; and Helani Galpaya, Ayesha Zainudeen and Tharaka Amarasinghe, "AfterAccess Asia Report 3.0", LIRNEasia, 22 May 2019, available at https://lirneasia.net/2019/05/afteraccess-asia-report3/.

124 United Nations, Economic and Social Council, conference room paper on eradicating poverty and promoting prosperity while leaving no one behind: implications for public administration, prepared for the sixteenth session of the United Nations Committee of Experts on Public Administration, held in New York from 24 to 28 April 2017.

125 United Nations, Economic and Social Council, "Background note on challenges for institutions in ensuring that no one is left behind: draft contribution by the Committee of Experts on Public Administration to the 2016 thematic review of the High-level Political Forum on Sustainable Development", fifteenth session of the United Nations Committee of Experts on Public Administration, New York, 18-22 April 2016.

126 United Nations Department of Economic and Social Affairs and Economic and Social Commission for Western Asia, "Formal/informal institutions for citizen engagement for implementing the post-2015 development agenda: report of the Expert Group Meeting", Paris, 20-21 October 2014 (ST/ESA/PAD/SER.E/202), pp. 14-15.

127 Felix Dodds, "Multi-stakeholder partnerships: making them work for the post-2015 development agenda" (2015), available at https://www.un.org/en/ecosoc/newfunct/pdf15/2015partnerships_background_note.pdf.

128 United Nations, Department of Economic and Social Affairs, "Policy Brief No. 123: Sandboxing and experimenting digital technologies for sustainable development" (3 December 2021).

129 Adam Corlett, *Examining an Elephant: Globalization and the Lower Middle Class of the Rich World* (London, Resolution Foundation, September 2016), available at http://www.resolutionfoundation.org/app/uploads/2016/09/Examining-an-elephant.pdf.

130 Internet Society, "Issue Paper: Asia-Pacific Bureau Digital Accessibility" (May 2017).

131 ODI, "'Leave no one behind' – five years into Agenda 2030 Guidelines for turning the concept into action", 21 January 2021, available at: https://odi.org/en/publications/leave-no-one-behind-five-years-into-agenda-2030-guidelines-for-turning-the-concept-into-action/.

132 Niki Rodousakis and Antonio Mendes dos Santos, "The development of inclusive e-government in Austria and Portugal: a comparison of two success stories, *Innovation: The European Journal of Social Science Research*, vol. 21, No. 4, pp. 283-316, available at https://doi.org/10.1080/13511610802591892.

133 Digital Watch, "Malaysia launches digital inclusion council" (17 October 2019), available at https://dig.watch/updates/malaysia-launches-digital-inclusion-council.

134 Smart Nation Singapore, "Digital Society", available at https://www.smartnation.gov.sg/about-smart-nation/digital-society; the first of the bullet points highlighting the pillars of the programme calls for "making technology more accessible to every Singaporean".

135 United Nations, Department of Economic and Social Affairs, Youth Participation Committees, Republic of Korea, United Nations Public Service Awards, 1st place winner, 2010.

136 United Nations Economic and Social Council, "Background note on challenges for institutions in ensuring that no one is left behind: draft contribution by the Committee of Experts on Public Administration to the 2016 thematic review of the High-Level Forum on Sustainable Development", prepared for the fifteenth session of the United Nations Committee on Public Administration, held in New York from 18 to 22 April 2016.

137 United Nations, WSIS Action Lines and Facilitators, World Summit on the Information Society, WSIS+10 United Nations General Assembly High-Level Meeting, available at https://publicadministration.un.org/wsis10/WSIS-Action-Lines-and-Facilitators.

138 Singapore, Government Technology Agency, "Digital Government Exchange (DGX) reports" (24 January 2022), available at https://www.tech.gov.sg/media/corporate-publications/digital-government-exchange-reports.

139 United Nations, "Transforming our world: the 2030 Agenda for Sustainable Development" (A/RES/70/1) paras. 17.9 and 17.16, available at https://sustainabledevelopment.un.org/post2015/transformingourworld.

5. The Future of Digital Government: Trends, Insights and Conclusions

The 2030 Agenda for Sustainable Development is an agenda for people, planet, prosperity, peace and partnership. It promotes novel approaches to achieving sustainable development in all countries, embracing innovative solutions that can propel humanity forward. The 17 Sustainable Development Goals (SDGs) formulated by the United Nations as part of the Agenda articulate the most urgent global challenges within a coherent framework and serve as the blueprint for building a better world.

Information and communications technology (ICT) has played a key role in promoting innovation in governance, supporting the development of e-government and serving the broader goals of sustainable development in multiple sectors. Progress in e-government has a direct impact on the realization of Goals 16 and 17 but also contributes to the achievement of many other SDGs and related targets. It is envisioned that the role of e-government will continue to grow in terms of providing public services, responding to crises and emergencies such as pandemics, and strengthening digital cooperation and collaboration at the global and regional levels as outlined in the Secretary-General's report on digital cooperation.[1] In *Our Common Agenda*, the Secretary-General emphasizes that the fourth industrial revolution has changed the world and that digitalization—and, by extension, digital government—fosters collaboration, connection and sustainable development and "is a global public good that should benefit everyone, everywhere".[2]

Since 2001, the United Nations Department of Economic and Social Affairs (UN DESA) has been monitoring the progress of e-government development in Member States through the United Nations E-Government Survey. Over the past decade, this report has become an invaluable asset for countries, providing longitudinal insights on digital public services and serving as benchmark for measuring and evaluating e-government development. The United Nations E-Government Survey tracks progress and offers rigorous, data-driven country and regional analyses by assessing findings reflected in the E-Government Development Index (EGDI), a composite index based on the weighted average of three normalized subindices—the Telecommunications Infrastructure Index (TII), the Human Capital Index (HCI), and the Online Services Index (OSI). Based on index values, Member States are ranked and assigned to one of four main groups (very high, high, middle or low), each of which is further divided into four distinct rating classes or quartile subgroups for more granular analysis. The present Survey provides an assessment of progress in e-government development at the global, regional, national and local levels and offers observations relating to key digital principles essential for the achievement of the SDGs.

Chapter 5

The present edition of the E-Government Survey illustrates how e-government has evolved from a siloed, technocratic approach to governance in a handful of high-income countries to a whole-of-government and whole-of-society approach undertaken in a broad range of countries; guided by its provisional title focusing on the future of digital government for sustainable development, this edition also offers observations on expected future trends. E-government is now an essential feature of governance, playing a central role in the way Governments operate at virtually all levels.

The digital revolution has unleashed almost unfathomable opportunities for sustainable development. More than any previous technological transformation, the digital age is characterized by interdependence, requiring international cooperation between Governments, industries, scientific and technological communities, and civil society in a wide range of sectors and areas, including trade and finance, communications, e-government and cyber security.

According to a recent estimate, global Internet Protocol (IP) traffic, a proxy for data flows, increased from about 100 gigabytes (GB) per day in 1992 to more than 45,000 GB per second in 2017; in 2021, global IP traffic has exceeded all Internet traffic up to 2016, and in 2022, it is projected to reach 150,700 GB per second as more people come online and the Internet of Things (IoT) continues to expand. The global digital economy is expected to reach $25 trillion within 5-6 years and is already growing at a faster rate than global gross domestic product (GDP).[3]

This final chapter summarizes the key findings detailed in the previous chapters and offers forecasts on the future of digital government. It examines the rise of the digital economy and the shift from an operational e-government approach to a more strategic, policy-oriented and politically driven agenda guiding e-government development. The chapter explores how artificial intelligence (AI) and other frontier technologies are driving the evolution of anticipatory, predictive and responsive digital services and highlights other trends in e-government development at the global, regional, national and local levels (analysed in depth in chapters 1-3). The importance of leaving no one behind—by ensuring that government services and opportunities to contribute to governance are made available to all segments of the population both online and offline in the hybrid digital society (covered in chapter 4)—is addressed at the end of this chapter.

5.1 Megatrends at the global and regional levels

The growing reliance on digital technologies to meet everyday needs and to address special challenges (such as mitigating the effects of the COVID-19 pandemic) has increased the urgency surrounding the digital transformation across the world, contributing to improved EGDI values for most United Nations Member States. While the upward trend is encouraging, overall e-government development has not gained significant momentum over the past two years, with the global average EGDI value rising only slightly from 0.5988 in 2020 to 0.6102 in 2022 (see figure 5.1).

As noted in chapter 1, the numbers of countries in the very high and high EGDI groups have risen, while the totals for the middle and low EGDI groups have declined. Between 2020 and 2022, the number of countries in the very high and high EGDI groups increased from 57 to 60 and from 69 to 73, respectively, while the middle and low EGDI groups saw respective declines from 59 to 53 and from 8 to 7. More than two thirds of the world's countries are now in the high or very high EGDI group, reflecting sustained e-government development.

Figure 5.1   EGDI Global and Regional Average Value
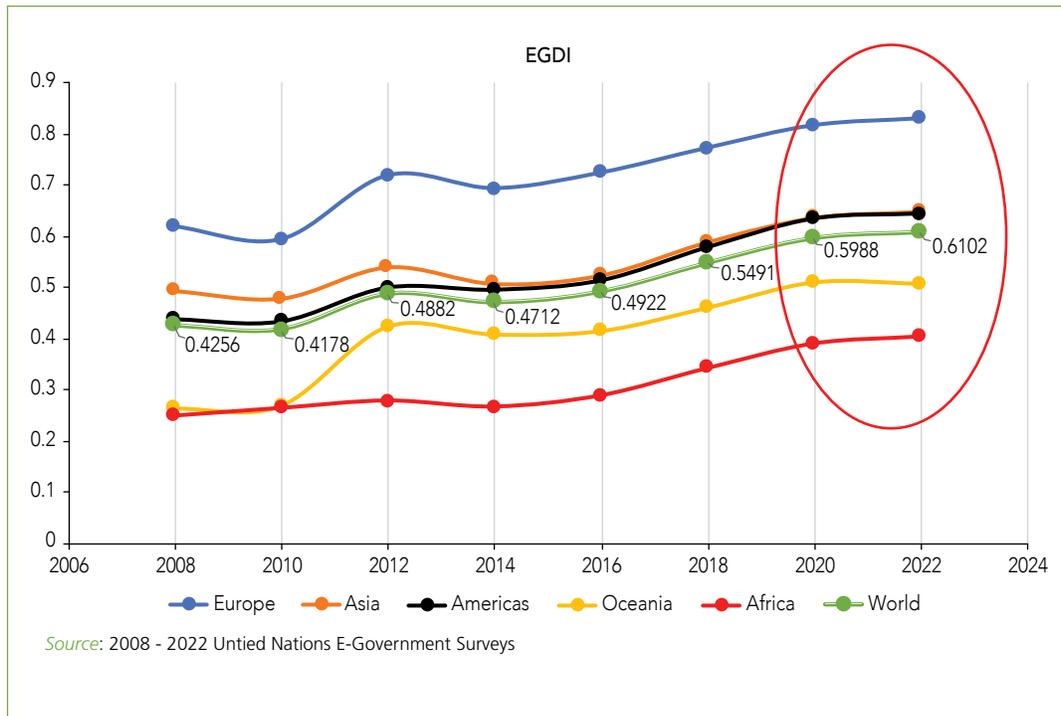
Source: 2008 - 2022 Untied Nations E-Government Surveys

A growing number of countries have strengthened their institutional and legal frameworks for e-government development. Most countries have a national digital government strategy, as well as legislation on cybersecurity, personal data protection, national data policy, open government data, and e-participation. Individuals and businesses are increasingly able to interact with public institutions through online platforms, obtain information on legislation relating to freedom of information, and access public content and data.

The higher overall value for global e-government development in 2022 is largely attributable to progress made in strengthening telecommunications infrastructure, though online services provision has also improved. Over the past two years, most countries have concentrated on dealing with the COVID-19 pandemic, prioritizing online services provision centred around health, education, social protection, and in some cases justice. The most notable expansion in online services provision has been in the area of social protection; the number of countries with national portals that allow users to apply for benefits such as maternity care, child subsidies, pensions, housing, and food allowances has grown by 17 per cent since 2020. As noted in chapter 1, the number of countries providing at least 1 of the 22 online services assessed in the 2022 Survey has increased by 16.7 per cent globally, and 61 per cent of the Member States offer more than 16 services.

There is a clear trend towards the full digitalization of government services, which would give users the ability to complete virtually all types of transactions entirely online. At present, however, many countries use their portals to provide information and offer only partially digitalized services, with citizens needing to appear at government offices in person to complete most transactions.

Despite investments in technology and the development gains achieved in many countries, the digital divide persists. Ongoing challenges continue to undermine the development efforts of countries in special situations, in particular least developed countries (LDCs). In Africa, for example, the cost of mobile broadband subscriptions as a percentage of per capita gross national income remains very high in relative terms.

Using the global average EGDI value as a proxy for measuring the digital divide, the 2022 Survey indicates that about 45 per cent of the combined population of the United Nations Member States (3.5 billion people) still lag behind; the map in figure 5.2 illustrates which areas of the world are most vulnerable within this context.

Figure 5.2   Geographical distribution of countries with EGDI values above and below the global average EGDI value

Global average EGDI (0.6102)
- Higher than average
- Lower than average
- No data

UNITED NATIONS Geospatial
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.
Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.
A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

Map No. 4642.25
Jul 2022

As illustrated in chapters 1 and 2, digital development is accelerating in both developed and developing countries. The world's continents are more connected, and almost all Governments are producing innovative web-based applications and dynamic new business models to transform the delivery of education, health and other public services. However, the path to digital inclusion and sustainable development remains fraught with obstacles and uncertainties, especially in Africa and among LDCs and small island developing States (SIDS). As pointed out by United Nations Deputy Secretary-General Amina Mohammed, the digital divide will become "the new face of inequality" unless decisive action is taken by the international community.[4]

Progress in bridging the digital divide through e-government development varies from one region to another. In Africa, 95 per cent of the population lags behind; only 4 of the region's 54 countries (South Africa, Mauritius, Seychelles and Tunisia) have EGDI values above the world average, and the very high EGDI group includes none of the countries in Africa. Nevertheless, there are positive (if fragmented) signs of digital progress in the region, reflected in the movement of Côte d'Ivoire, Zambia and Rwanda from the middle to the high EGDI group and the significant improvement in EGDI values for Guinea, Madagascar, Democratic Republic of the Congo, Egypt, Algeria and Benin between 2020 and 2022.

As shown in Figure 5.1, all of the world regions have improved their average EGDI values over the past two years, with the exception of Oceania, which registered a decline for the first time since 2016, largely owing to challenges linked to telecommunications infrastructure development. In Oceania, 11 of the 12 SIDS have EGDI values lower than the world average, leaving 92 per cent of the population on the wrong side of the digital divide. However, the region also includes top performers New Zealand and Australia, Fiji has an EGDI value higher than the world average, and Nauru and Vanuatu have seen significant improvement in their EGDI values.

While Asia has distinguished itself as the region with the highest proportion (51 per cent) of countries with improved EGDI values, it nonetheless mirrors the global megatrend; 19 of the region's 47 countries have EGDI values below the world average, and almost 45 per cent of the population lags behind in terms of EGDI development indicators. Among these 19 countries, however, some positive development patterns have emerged; Jordan and Bangladesh have seen a notable increase in their EGDI values, and Lebanon, Nepal and Tajikistan have moved to a higher EGDI group—illustrating the ability of Asian developing countries to strengthen their digital capacity and benefit from evolving digitalization opportunities to achieve the SDGs.

Levels of e-government development are higher overall in the Americas, where 21 of the 35 countries surveyed have EGDI values above the global average and just under 11 per cent of the population lags behind. Among countries with EGDI values below the world average, development trends have been mixed; Grenada, Suriname, Jamaica, and Saint Kitts and Nevis have improved their high EGDI values, and Guyana and Belize have moved from the middle to the high EGDI group, while Dominica, El Salvador, Honduras, Nicaragua and Venezuela have seen a decline in their EGDI values, and Haiti has moved down to the lowest EGDI group.

Table 5.1 shows the geographical distribution of the population in countries with EGDI values above and below the world average for 2022.

In the preamble to resolution 73/218, the General Assembly emphasizes that "there is a pressing need to address the major impediments that developing countries face in accessing new technologies", highlighting the fact that "important and growing digital divides remain between and within developed and developing countries in terms of the availability, affordability and use of information and communications technologies and access to broadband".

Table 5.1   Regional distribution of the population in countries with EGDI values above and below the average global EGDI value, 2022

Geographical distribution of the population	Population (in thousands)	Percentage
United Nations Member States		
All 193 Member States	7,750,030	100.0%
Countries with EGDI values below the global average	3,434,715	44.3%
Africa		
All 54 countries in Africa	1,338,827	
Countries with EGDI values below the global average	1,266,329	94.6%
Americas		
All 35 countries in the Americas	1,018,121	
Countries with EGDI values below the global average	108,966	10.7%
Asia		
All 47 countries in Asia	4,603,990	
Countries with EGDI values below the global average	2,060,612	44.8%
Europe		
All 43 countries in Europe	747,294	
Countries with EGDI values below the global average		0.0%
Oceania		
All 12 countries in Oceania (excluding Australia and New Zealand)	11,476	
Countries with EGDI values below the global average	10,580	92.2%

For many developing countries and countries in special situations, productive participation in the digital economy represents a massive, complex challenge. Pursuing digital economic integration without the appropriate institutional support, regulations, policies and strategies can lead to job losses, increased inequality, and data privacy and security issues. ICT has the potential to provide new solutions to development challenges and to integrate developing and least developed countries into the global economy, but international guidance and support are needed to help mitigate the risks for these countries. The global community can best support the digital transformation of countries in need through multilateral and multistakeholder approaches using United Nations and other global and regional platforms, forging effective partnerships with national and regional regulatory and development organizations and the private sector and improving local technical capabilities at both the institutional and individual levels.

Now is the time to act. The digital divide existed long before COVID-19 but has been exacerbated by the pandemic, which has created new obstacles to national and local digital transformation. The ongoing humanitarian, economic and health crisis has had the greatest impact on the most vulnerable in society, especially children and youth, women and girls, older people, and persons with disabilities. In addressing development and pandemic-driven challenges, Governments must prioritize vulnerable populations and ensure that their health, rights and dignity are safeguarded.

Recovery offers the chance for true transformation. Using the SDGs as a guide for post-COVID recovery can help ensure that no one is left behind and no one is left offline. Efforts should focus on strengthening infrastructure and collaboration of all kinds (between cities, at the regional level, and with international organizations) to ensure that e-services are available and accessible for all.

5.2   The impact of the COVID-19 pandemic on digital government

The emergence of COVID-19 revealed just how unprepared most Governments were to deal with an extended global crisis, but over the past two years the pandemic has driven efforts to achieve a real digital government transformation in support of building a sustainable and digitally resilient society. COVID-19 has given Governments the chance to demonstrate that they can play a central role in addressing society-wide challenges. As noted in the previous edition of the Survey, "the COVID-19 pandemic has forced Governments and societies to turn towards digital technologies to respond to the crisis in the short term, resolve socioeconomic repercussions in the midterm, and reinvent existing policies and tools in the long term".

New technologies have played a crucial role in government efforts to coordinate the pandemic response and elicit public cooperation during the crisis, keeping societies functional during rolling lockdowns and underpinning solutions across sectors and borders. Now, the global community is shifting its attention to the far-reaching implications and impact of the COVID-19 vaccine rollout, which will finally enable countries to transition from crisis response to recovery and rebuilding.

During the pandemic, many countries have adopted policies and implemented initiatives aimed at increasing connectivity, with an emphasis on bringing more people (especially underserved populations) online. One recent example is the new Digital Terrestrial Television infrastructure in Kenya, which is intended to serve millions of low-income households. Countries are becoming increasingly interested and involved in exploring how digital technologies can be used to support development and advance the SDGs.[6]

The number of Internet users rose from 4.1 billion in 2019 to 5.2 billion in 2022.[7] Statistics from the International Telecommunication Union (ITU) indicate that the number of Internet users rose by 782 million (17 per cent) during this period.[8]

More than ever before, Governments are inviting input from a wide range of stakeholders through collaborative partnerships and even public crowdsourcing to bring in ideas on effective approaches to dealing with the COVID-19 crisis. Digital advancements and e-government development have been particularly noteworthy—and in some respects transformative—for the health-care and education sectors.

Governments have made digital technologies a key component of their COVID-19 response strategies to improve coordination and communication between different agencies and to provide residents with easy access to information about the public health situation. The goal has been to streamline inter-agency communication and support the open exchange of information between the Government and the people in order to address challenges driven by the pandemic.

Digital technologies are also being used to improve vaccine delivery. The World Health Organization (WHO) has created a digital platform that allows the monitoring of vaccines from production to distribution, helping to ensure that there is better coordination between the different agencies involved in the process and that vaccines are tracked, delivered and administered in a timely and organized manner.[9]

Procurement processes—traditionally rigid and time-consuming—have been improved in many countries to allow Governments to respond more expeditiously to the urgent demands surrounding the pandemic. Public authorities have often been able to secure masks and testing kits and construct COVID-19 treatment facilities with unprecedented speed and efficiency. India, for example, has developed an e-procurement system for all purchases related to COVID-19, reducing the average bid time from two weeks to three days. The United States Navy has "accelerated" its supply acquisition time by an average of 32 per cent and has strengthened overall efficiency in procurement—even with a 95 per cent remote workforce.[10]

Digital technologies have constituted a key component of the COVID-19 response efforts of international agencies. For example, during the initial months of the pandemic, the Europe and Central Asia Regional Office of the United Nations Children's Fund (UNICEF ECARO) collaborated with its parent organization and EPAM Systems to develop HealthBuddy Covid-19, a chatbot app trusted as a credible source of COVID-19 information and advice. About a year later, ECARO worked with WHO/Europe on the development of HealthBuddy+ to provide verified factual information on COVID-19 and to actively engage communities in reporting rumours and preventing the spread of misinformation.[11]

Virtual communication has become the norm, challenging many of the conventional approaches to working, interacting with different stakeholders, and providing services in the public sector. New operating standards have emerged that allow greater adaptability and collaboration. Governments are accelerating the digital transformation by migrating to cloud-based services such as Microsoft Office 365 and Amazon Web Services for better productivity, security and collaboration.[12]

Online video platforms are convenient and facilitate increased interaction in multiple contexts. Community engagement in e-government has become more inclusive, as all those interested can now participate via electronic forums. Working together on virtual collaboration platforms enables government agencies and community members to communicate in real time and to share ideas and information that can enhance the quality of life or stimulate economic progress.

Some of the most dramatic shifts towards increased digitalization have occurred in education and the world of work. The boundaries of the ICT infrastructure have been pushed by remote work and distance education. In business and professional contexts there has been a shift towards increased flexibility; in many cases around the world, employees no longer have to live where they work, Zoom and Microsoft Teams have taken the place of conventional office meetings, and line-of-sight

supervision is no longer a given. Online education has been available for many years but traditionally constituted a niche option or add-on; with the pandemic-driven restrictions on movement and contact, remote schooling became the norm in many settings for an extended period, compelling Governments to expand digital capacities and institute new educational policies aimed at addressing evolving needs. As has happened in the workplace, many of the pandemic-related remote learning adjustments in the education sector have been normalized and integrated within a more flexible vision of what is considered standard practice. For example, the Department of Education for the state of New South Wales has launched a digital strategy for schools that allows students in Australia to learn through personalized and flexible programmes and enhances collaboration between teachers and parents.[13]

The restrictions surrounding COVID-19 have forced Governments to look at services delivery in a different light. Conventional wisdom has long dictated that personalization requires human contact, but this assumption has been challenged by emerging digital options. Digital platforms and applications tend to have a relatively simple, intuitive and user-friendly interface, offering greater accessibility and more personalized services provision. Site administrators often invite feedback in order to improve the user experience. Only a few government services require in-person delivery; the majority can be provided fully online. During the pandemic, the Government of the United Kingdom has scaled the concept of digital justice, holding many court proceedings online. The United States Supreme Court is conducting hearings through teleconferencing platforms. The Government of Spain has deployed an AI-powered health-sector chatbot called Hispabot-Covid 19 to answer over 200 questions on a variety of topics, including symptoms and emergency contact information.[14]

Digital identity has become more widely accepted by governments and in many cases physical presence is no longer required for services, with online methods established for identity verification and authentication. In Chile, for example, a digital ID system allows users to enrol themselves as beneficiaries in social programmes and check their support status online.[15]

The pandemic has accelerated the use of analytics and AI in e-government and business, and the 2020 *Global Trends* report and various surveys indicate that this trend is likely to continue through 2022.[16] According to a PwC research study carried out in 2021, 52 per cent of companies in the United States expedited their AI adoption plans as a result of the COVID-19 crisis, and 86 per cent believed that AI would become a mainstream technology where they worked as early as last year.[17] According to a survey carried out by the Harris Poll as part of a 2021 research study conducted by Appen, 55 per cent of businesses said they had accelerated the implementation of their AI strategy in 2020 as a result of the pandemic, and 67 per cent expected to expand their use of AI in 2021.[18]

The COVID-19 crisis has provided an impetus for digital expansion and development, which has created the need for improved digital capacities and capabilities within the Government and among users. Many countries have allocated increased resources to training programmes that promote digital literacy, the acquisition of coding skills, and digital media expertise. Internal coordination, open access to government data, and interoperability have been key priorities in government digitalization strategies. The Digital Nations group (comprising 10 digitally advanced nations) established a non-binding charter in late 2021 that incorporates open data and transparency provisions and delineates key principles for responsible and effective e-government.[19] Similarly, the Open Data Charter represents "a collaboration between over 150 Governments and organizations working to open up data".[20] E-government interoperability is especially critical; many Governments have developed a whole-of-government digital architecture that has improved coordination and ensured continuity of operations across the public sector. Efforts are also being made to expand Internet accessibility and the acquisition of digital skills for the general population.[21] Strengthening the digital government framework and empowering citizens with the tools they need to make well-informed decisions effectively increase the capacity of Governments to function effectively in the digital era and prepare for future crises.

To improve their readiness for health emergencies, Governments are updating and upgrading data systems to manage information-sharing between health-care providers, government agencies and the public. Digitalization increases the speed of data transmission while also minimizing errors; it also enables better coordination and integration among health-care providers to improve treatment efficacy. The Ministry of Health and Family Welfare in India has set up the National eHealth Authority (and its official website, the National Health Portal) using public and private investment resources. Among other things, the Authority is responsible for developing and implementing health-related IT systems in India and has launched the e-RaktKosh initiative "to connect, digitize and streamline the workflow of blood banks across the nation".[22] Similar initiatives have sprung up around the world during the pandemic, signalling the importance of global digital government transformation for the health and welfare of society.

Prior the pandemic, government regulations and policies tended to be inflexible and were often subject to lengthy bureaucratic processes leading up to their adoption; by the time they were published, they were often obsolete. The urgency surrounding the COVID-19 crisis has forced Governments to move more swiftly. This has presented challenges at multiple levels; structural adjustments have been required to streamline and speed up operations, and decision-making has become more complex, as there are no precedents to guide Governments in dealing with a global pandemic. Governments still lag behind commercial enterprises in leveraging digitalization for development. However, notable progress has been made on a number of fronts; as noted previously, procurement processes for government agencies were once rigid and time-consuming, but new approaches have been adopted to ensure greater efficiency and faster response times in providing critical supplies and facilities.

The COVID-19 pandemic has had a significant impact on the world's economies and societies and has largely been responsible for accelerating the digital transformation process and for changing the role of digitalization and the way it is perceived at the international, regional, national and local levels. In a recent poll conducted in the United Kingdom, 60 per cent of those surveyed claim that they are more confident using digital public services now than before the pandemic began, and 75 per cent say they would feel comfortable accessing these services via their smartphones. This increase in confidence is directly correlated with the expansion of digital transformation efforts by Governments.[23]

Governments that in the past may have responded with typical bureaucratic sluggishness and intransigence have demonstrated how quickly they can adapt and change course to address immediate needs by leveraging the frontiers of technology and human inventiveness and by working collaboratively with multiple stakeholders, including the private sector.

5.3   The importance of engaging the private sector

The private sector has been at the forefront of the digital transformation for a number of years, and the COVID-19 pandemic has greatly accelerated developments in this area. Respondents to a survey conducted by McKinsey & Company in mid-2020 indicated that the time needed to execute specific changes within their companies for core internal operations (such as back-office, production, and R&D processes) and for interactions in their supply chains, had declined sharply; for many of the changes, "companies acted 20 to 25 times faster than expected. In the case of remote working, respondents actually say their companies moved 40 times more quickly than they thought possible before the pandemic."[24]

Satya Nadella, Chief Executive Officer of Microsoft, remarked in April 2020 that the world was seeing "several years' worth of digital transformation in a few months as societies around the world scrambled to adapt to the changes forced upon them by the COVID pandemic".[25] As Governments imposed lockdowns and other social distancing measures, digital solutions allowed the health and education sectors to continue to operate. Many companies were able to rapidly provide employees

with digital tools to enable remote work, and retailers introduced or expanded digital sales platforms to maintain relationships with customers.

Private companies have quickly adopted new digital technologies and innovative processes to improve efficiency and productivity. The private sector has raised the bar on the customer experience, and the public sector is expected to keep up. As noted in the previous section, Governments have made notable progress in a number of areas, but digital transformation is lagging overall due to bureaucratic red tape and a lack of resources.

Government decision makers worldwide are well aware of the importance and impact of digitalization but acknowledge the many challenges that must be overcome to achieve comprehensive digital transformation. About 76 per cent of the 1,200 government officials from over 70 countries surveyed for a recent Deloitte study believe that "digital technologies are disrupting the public sector", and 96 per cent characterize "the impact on their domain as significant". However, nearly 70 per cent of the respondents believe that the public sector lags behind the private sector in terms of digital capabilities.[26] About 37 per cent respondents indicate that they are satisfied with their organizations' current reaction to digital trends and have confidence in their readiness to move forward with large-scale digitalization. The study identifies several key challenges facing government institutions as they pursue digital transformation, including budget issues, the ageing population, and the preference of many millennials for private sector employment.

Budget issues constitute a challenge for all countries; developing countries must decide how to address a multitude of development priorities with limited resources, and developed countries are locked into spending billions of dollars to maintain massive but largely obsolete "legacy systems". The United States Government, for example, still spends 70 per cent of its $100 billion IT budget to support legacy systems, some of which date back to the 1970s.[27] Removing these outdated systems and replacing them with less expensive and more efficient new technologies will facilitate digital transformation, help Governments adapt to evolving societal demands linked to increased digitalization, and support the development of efficient, fully integrated systems that streamline government processes—including the management of national crises and emergencies. Full-scale public sector digitalization will take time; unlike private companies, public agencies are reluctant to take risks in implementing innovative processes that are not fully tested or for which successful outcomes are not assured. This slows the pace at which government agencies adopt new technologies and practices that can improve the customer experience.

The pandemic has further reinforced the need for the public sector to catch up with the private sector in terms of attracting talent and updating personnel skills. Over the past decade, the tedious public sector hiring process and government shutdowns, furloughs and pay freezes have made millennials lose interest in government jobs; much of this talent pool is being absorbed by enterprising private sector companies.[28] Upskilling the workforce is essential for digital government transformation but is likely to prove challenging. In sectors such as health care and social services, greater emphasis is placed on subject matter expertise than on proficiency in the use of digital technologies. Employees in these sectors often lack technical skills but are reluctant to spend additional working hours in training. Attracting the kind of talent needed for the next generation of digitalization requires an ecosystem-centric approach in which the public sector plays an entrepreneurial role in society, "paying attention to concrete institutions and organizations in government that are able to create long-run growth strategies" and working in partnership with the private sector to spur growth and innovation. Policy makers need to promote a culture of entrepreneurship by creating a more symbiotic public-private innovation ecosystem and acting as lead risk taker and market shaper to ensure more opportunities for private sector engagement on innovation (including SMEs and startups, for example). Governments should promote and strengthen this ecosystem by investing more in research and development and by bringing expertise together and create willingness to invest in high-growth and high-risk areas.[29]

5.4   The future of digital transformation in the public sector

The COVID-19 pandemic has exposed many of the shortcomings of government systems and practices. Existing public sector institutions are not designed for rapid adaptation to sudden changes or unexpected crises in society. They function largely on the basis of pre-pandemic industrial-era assumptions about how government should operate and are therefore not equipped for rapid response or information dissemination in emergency situations.

Digital transformation changes the status quo, requiring Governments to adopt innovative technologies that help them become more responsive, accountable, agile and efficient. The only way Governments can survive in the digital era is to embrace change and create a culture of innovation in which people and organizations experiment, learn and develop. There must be a commitment to staying the course and a willingness to resist outside forces or pressures that seek to undermine digital transformation. Governments must break down the silos that divide IT systems in order to improve collaboration between departments and achieve optimal digital integration and development. The culture of the public sector needs to change, with priority given to increased flexibility and productivity for government employees and improved user-centred approaches and outcomes.

Digital transformation in the public sector is not just about improving process efficiencies in government organizations; it also plays a key role in strengthening public services provision and opportunities for community engagement. Giving residents a voice and the chance to contribute to and collaborate in governance creates a greater sense of public trust, and meeting evolving customer service needs remains is a top priority. One of the big differences between the private sector and the public sector is that the latter cannot choose its customers. A commercial enterprise can identify a specific target market and segment its addressable customer base, deciding how it wants to brand, market and price a commodity in order to appeal to those most likely to use a product or service. Using such strategies, a private company really can chose its customers. This is not possible for Governments, as the public sector must serve everyone.

Creating and maintaining a dynamic system that serves everyone is a huge challenge. Although private enterprises have been more proactive in pursuing digitalization, government organizations stand to reap the most significant benefits from comprehensive digital integration, given the massive scale and scope of operations and the need for speed and efficiency in the provision of services essential to the well-being and survival of humanity. The pandemic forced Governments to speed up digitalization processes to keep up with evolving demands and protect citizens whose lives were at risk. The rapid onset and spread of COVID-19 forced acceleration in many areas of government digitalization, as public agencies needed a way to procure and coordinate the distribution of essential resources such as vaccines, medicines and food supplies as quickly and efficiently as possible. Designing and implementing digital systems can be a complex process; while the technology component is critical, attention must also be given to factors such as culture and mentality, development capacities and capabilities, data access and connectivity, data privacy and security, and the ability to work iteratively and prototype rapidly. Collaboration with a variety of stakeholders is also essential.

Digitalization facilitates public participation in governance. Governments must find new ways of empowering members of society and engaging them in development discussions and decisions. Making open government data available increases transparency and accountability and creating accessible software applications and participation platforms encourages community involvement. Governments need to make the general public part of the solution—not just during a crisis but on an ongoing basis. Denmark, for example recently launched an e-participation initiative, where citizens can make suggestions for new legislation in the form of e-petitions. The initiative, which translates directly into "citizen suggestion" is administered by the Danish parliament.[30]

In *Our Common Agenda*, the Secretary-General calls for a fundamental shift in the way government is perceived and operates and the role of the general public and other stakeholders within this context. The overarching implication is that public agencies must become more human-centred, actively considering those they serve as equal co-creators of public value. This will require the Government to move away from the traditional top-down bureaucratic structure towards a more decentralized flat model in which data represent a central asset that can be shared and used to improve the efficiency and effectiveness of government operations.

A digital society is largely data driven. Public institutions are working to achieve data optimization by developing novel approaches to data collection, collation, analysis and dissemination. Across the globe, trends surrounding dynamic data and data fluidity are changing how data are being used and shared by Governments and their partners in academia, civil society and the private sector. Data-centricity requires Governments to make data accessible, usable, and actionable across all levels of government. Data from multiple sources must be made available in one place and must be properly secured and protected.

5.4.1 Open Government Data

Making government data, information and digital resources readily available to the public is crucial not only for improving administrative operations and public services delivery but also for engaging with communities and building trust. Governments are working to strengthen trust by publishing data sets in open formats free for public use; access to open government data helps prevent information manipulation and contributes to public sector efforts to increase transparency, combat corruption, and strengthen public sector accountability. There is also growing interest in open-source software and how it can be used for development.

The open government data movement will continue to gain momentum as access to information becomes a key driver of development. Open application programming interfaces (APIs) will facilitate even more efficient access to public sector information through citizen-friendly applications. The world is currently seeing an increase in development around APIs and the rise of open data as a whole. Integration between online public services and mobile applications will become increasingly common, and open APIs have been emerging particularly with the increased digitalization of back-office processes, making it more efficient for government agencies to provide access to core information or transactional systems via a user-friendly interface.

Many forward-thinking Governments have successfully been implementing digital services using a variety of new approaches and technologies, while others still face major obstacles to digital development. Some of the most advanced solutions to be adopted by Governments for their digital transformation, along with some of the attendant challenges, are explored in the subsections below, as the information provided may contribute to a better understanding of the problems Governments face, how to overcome them, and ways in which the public sector may be re-invented for the digital era.

5.4.2   Cloud computing technology

Among the different solutions adopted by countries engaged in digital transformation, cloud technology is playing a major role, allowing government agencies to simplify and optimize the management of IT resources and facilitating the adoption of new digital technologies. The public sector has turned to cloud services to strengthen agility, scalability and cost-efficiency in an era marked by exponential growth in the volume of data processed. Cloud technology provides computational infrastructures that can be quickly and automatically scaled up to meet load peaks and can handle the data and systems of different agencies simultaneously and securely—which is difficult to achieve using traditional data centres. New tools are emerging that allow Governments to improve the quality, efficiency and effectiveness of public services and support the creation of new development opportunities for services provision.

Governments around the world are turning to cloud computing technology also to facilitate disaster response and humanitarian efforts. Before disaster strikes, governments and organizations are leveraging cloud computing capabilities in their disaster preparedness efforts – from creating online maps and backing up and securing valuable data, to setting up networks of cloud-connected sensors that can provide a community with critical early warning before a landslide or earthquake.

Governments make use of a variety of cloud configurations, including the public cloud, the private cloud, the hybrid cloud, and the multi-vendor cloud.

A public cloud is characterized by the utilization of shared infrastructure; it may also be referred to as a commercial cloud, as the infrastructure is owned by a third-party service provider that has full control of its systems and makes them available to paying customers (including different Governments around the world), which then share processing capacity, applications and storage. This solution has three main advantages. The first is almost unlimited computing capacity, made possible through hyperscaling capabilities, as well as high ease of use, configurability and interoperability. The second is ecosystem development. Governments use the public cloud not only for the infrastructure, but also for the possibilities it offers for comprehensive e-government ecosystem development. Governments can use the building blocks provided by the commercial cloud to develop services that are virtually unlimited in terms of number, reach and complexity. The third advantage is resiliency. The public cloud is characterized by stability and flexibility, offering computing capacities that can be scaled according to changing needs. It also helps governments to rebuild and ensure continuity of citizen services and essential governmental functions following a crisis, conflict or disaster (See Box 5.1). A final advantage is cost-effectiveness; individual Governments would never be able to replicate the broad offerings of the public cloud within their respective private clouds.

A private cloud offers cloud computing services to select users via a secure private internal network; in the present context, it is maintained by a government for the exclusive use of government agencies and personnel. Individual government bodies use the cloud as they would an external cloud, but it is completely controlled by the Government. The private cloud may be on-site (based on infrastructures entirely within the domain of the Government, which assumes full of control of and responsibility for managing the maintenance and security of data centres that host data and services), or it may be managed at third-party data centres, where the Government is provided with dedicated resources.

Box 5.1   Cloud Technology for Disaster Response in Ukraine

Communications networks are critical for operational planning, managing resources, accessing information, and contacting citizens that may still be in danger. However, following a disaster, communities are often left with little or no internet connectivity, which can significantly impact the speed and efficiency of identifying those who need help most and developing a response plan quickly. Re-establishing network connectivity enables government agencies and relief groups to quickly collect and analyze data, to inform how best to deploy, direct, and distribute resources—food, water, and shelter—most efficiently, safely, and equitably to people who need them. Cloud computing and small satellites in low Earth Orbit (LEO) technologies - providing Internet access - are helping Ukraine government to rebuild and ensure continuity of citizen services and essential governmental functions following the disaster.

Shortly after Russia launched a military offensive in Ukraine, the Ukrainian government has successfully sustained its civil service provision by acting quickly to disburse its digital infrastructure into the public cloud, where it has been hosted in data centers across Europe. Their goal was to avoid the accidental or intended destruction and access by a foreign power. As such, the Ukrainian government was able to retain access and control over functions that are critical to nation building, such as the land registry. Using rugged compute and storage devices, government agencies began the process of uploading data to the cloud – data that had previously been stored in servers physically located within the country. Normally, it would take months to transfer large workloads, but with these devices, without the need for internet, transfers occurred in days. Many non-governmental institutions – such as universities, banks, television broadcasters, critical infrastructure – have also turned to cloud service providers to "migrate" their data to the cloud as a means to enable business and service continuity.

Cloud computing is also being used to help Ukraine's people from facilitating remote learning opportunities for students to monitoring air quality—specifically radiation levels—around nuclear power plants close to conflict zones in Ukraine, cutting-edge cloud technology is being used to help in a number of ways.

Sources: Disaster Response - Amazon Web Services https://www.groundstation.space/the-story-of-starlink-for-ukraine/

One of the advantages of the private cloud is that Governments can exert greater control over the characteristics of the infrastructure and services, especially with regard to security. A major disadvantage, however, is that the infrastructure may not offer the scalability needed to handle unforeseen peaks in demand.

A growing number of Governments are exploring a hybrid model, integrating the public cloud and private cloud in a single ecosystem made up of interconnected environments in which various resources are made available from either or both cloud infrastructures depending on government needs. This model allows Governments to take advantage of the large-scale resources available on the public cloud while also maintaining full ownership and control of the most sensitive data and services. In a hybrid environment, the use and distribution of computational resources from the private and public clouds are typically semi-automated and transparent to the user.

The term "multi-cloud" (or multi-vendor cloud) refers to the simultaneous use of multiple public and/or private cloud computing and storage services in a single architecture for the implementation of various user services and applications. This approach typically optimizes cloud infrastructure capabilities, is cost-effective, and reduces reliance on any single cloud provider. While a set of distinct computational resources belonging to different clouds can potentially be integrated at the application level, the fact that different public or private cloud environments are not fully interconnected presents a distinct disadvantage. Nonetheless, multi-vendor solutions allow Governments to be less dependent on individual services providers and give them the flexibility to adapt to different types of arrangements depending on the nature of the government data.

Cloud solutions have been successfully implemented in many of the most advanced countries in the world, including the Republic of Korea, the United States, the United Kingdom and Singapore. However, there are still some concerns about security and data protection.

One of the major concerns about cloud technology is that Governments are effectively ceding control over data management to third parties, which requires a high level of faith and trust that cloud services providers can comply with data rules and regulations and provide the level of security required. Blind faith is not an option. Before adopting any cloud solutions, Governments need to determine what can and cannot be done via the cloud and whether new policy and regulatory frameworks are needed to optimize operations and security. They need to develop a national strategy that identifies which cloud solution best supports data-driven government operations—one that ensures strategic autonomy and resilience, addresses security concerns, and allows Governments to retain full control over data and services.

Government sectors such as defence, energy and justice have a lower tolerance for risk and error. They are reluctant to experiment with technology due to security concerns and their special vulnerability to the challenges and disruptions that accompany institutional change. Even a small operational error or data breach can inflict damage that has have a long-term negative impact. Governments transitioning to cloud services need to address these concerns—especially those relating to data security—through advance planning. It is essential that centrally managed, regularly updated security measures and systems be adopted across the board.

5.4.3   Cybersecurity, privacy data protection issues

There has been a worrisome spike in cybercrimes and cyberattacks in recent years. Malicious activities in cyberspace are undermining digital trust in Governments and between States. Critical national infrastructure—characterized by growing digital interconnectedness in areas such as finance, power supply, education and health-care provision—is increasingly being targeted. These cyberattacks take various forms, causing data breaches and disruptions that affect business equipment, processes and operations. While global estimates of the damage caused by malicious cyberactivities vary, the fallout often amounts to billions of dollars in infrastructure repair costs, lost productivity, and personal financial losses. According to the ITU Global Cybersecurity Index 2020, risks linked to privacy issues are growing with the increased use of new connected devices and the constraints surrounding how private data are used by Governments.

Cybercrime is a growing concern to countries at all levels of developments. While 156 countries (80 per cent) have enacted cybercrime legislation, the pattern varies by region: Europe has the highest adoption rate (91 per cent) and Africa the lowest (72 per cent). The evolving cybercrime landscape and resulting skills gaps are a significant challenge for law enforcement agencies and prosecutors, especially for cross-border enforcement.[31]

Not all Governments have the knowledge or capabilities to tap into the vast opportunities or mitigate the inherent risks associated with the digital age. The evolution of digitalization is outpacing the ability of Governments to develop relevant regulatory and policymaking frameworks. Countries in special situations such as LDCs, landlocked developing countries (LLDCs) and SIDS face particular challenges in this regard, making them especially vulnerable to cybercrimes and cyberattacks.

Media reports suggest that data security breaches are occurring even at the highest levels and often have serious repercussions, with national and international cyberattacks threatening the privacy and financial safety and security of society as a whole. In many instances, public sector entities and members of the private sector (in particular individuals and micro, small and medium-sized enterprises) are simply unable to match the technical sophistication of cybercriminals and fall prey to ransomware (designed to extort money by blocking access to files or computer systems), malware (designed to gain unauthorized access to files or cause damage to a computer), or phishing (sending fraudulent emails that resemble emails from reputable sources with the intention of stealing sensitive data).

As more and more social and economic activities have place online, the importance of privacy and data protection is increasingly recognized. Of equal concern is the collection, use and sharing of personal information to third parties without notice or consent of consumers. 137 out of 194 countries had put in place legislation to secure the protection of data and privacy. In the European Union, the General Data Protection Regulation (GDPR) requires companies to get explicit consent from individuals before collecting or using their data.[32] Africa and Asia show different level of adoption with 61 and 57 per cent of countries having adopted such legislations. The share in the least developed countries in only 48 per cent.[33]

Currently, there is a lack of uniformity in data protection laws and regulations around the world, which can create conflicts when data are shared across jurisdictions.[34] However, efforts are being made to address this issue in some regions.

5.4.4 Evolving technologies and new approaches in digital government

Governments are working to address the practicalities surrounding digital technology development and integration (such as cloud computing capabilities and security issues), but it is equally important to direct attention towards innovative technology solutions that improve system functionality and the user experience. Governments should adopt data-driven, experimental and AI-assisted data-gathering systems and dynamic simulation models that allow them to explore how best to engage users, respond to their needs, and assess the impact of digital services. They should develop new methods for exploiting data-driven policy modelling tools, using systems thinking and foresight as well as pilot initiatives and sandboxes to design and validate the underlying conceptual frameworks behind these new solutions. Cloud computing represents an innovation in itself, as it provides the space for almost limitless digital development, but there are some evolving technologies and approaches that should be further explored by Governments working to bring the public sector into the twenty-first century; three promising options, explored below, include cognitive government, agile and adaptive government, and seamless government.

Cognitive government

Cognitive government leverages hindsight, real-time data, and foresight to drive policymaking and decision-making. According to the World Bank, the best Governments are constantly learning, evolving, and making decisions—just as people do. When the government perceives itself as a "cognitive system", it can take steps to learn more quickly. Cognitive systems make faster decisions by learning from past experiences and using real-time data to make more reliable projections about the future. This augmented learning and decision-making capability can create immense public

value. Governments can design programmes with an intelligence architecture in mind. The hindsight of past performance, coupled with real-time data in the present, can lead to optimal decisions for the future to manage the associated operational risks. By identifying and managing the potential risks associated with the use of digital tools and technologies, Governments can realize the transformative potential of digitalization to improve the sustainability of government operations.

Agile and adaptive government

The COVID-19 pandemic has highlighted the need for greater speed and agility in governance—and many Governments around the world have shown that they are up for the challenge, having been compelled by the health crisis to make timely decisions and act swiftly. Agile government is characterized by flexibility and adaptability in a number of areas, including policymaking, regulation, procurement and the workforce.

According to a World Economic Forum report, Governments characterized by greater agility and adaptability are able to be more responsive. The report emphasizes the need for fast, flexible, mission-centric government. Governments are beginning to look for ways to develop user-centred services that allow them to identify and respond to the needs of consumers more quickly and efficiently.

The call for agile government comes as many public agencies are struggling to keep up with the ever-evolving demands of their constituencies. A number of Governments are responding to this emerging dynamic by transitioning from rigid bureaucratic structures and hierarchies to a more decentralized flat model that allows greater operational fluidity and flexibility, as well as increased opportunities to interact with the general public and identify and respond to their changing needs. The ability of public agencies to rapidly assess and address the needs of constituents is becoming increasingly important in an era of constant innovation.

Seamless government

A growing number of government agencies are developing personalized, proactive public services, aiming to provide constituents with a "frictionless" customer experience. Governments have adopted several strategies to achieve seamless services delivery, including committing to fully digitalized services, designing proactive services clustered around life events, and building infrastructure to support seamless services delivery. The Organization for Economic Cooperation and Development has observed that the most innovative cities and countries have made seamless government a priority, aiming to minimize points of contention and friction in government interactions with the general public.[35] A genuine commitment to creating seamless government requires a shift from the traditional inside-out approach to an outside-in strategy that focuses on user-driven governance and services development; Governments need to engage with the public, invite feedback, and allow user realities—rather than traditional bureaucratic conventions—to guide services provision.

As part of the trend towards increased responsiveness to user needs, Governments are starting to explore how concepts such as life events, life journeys or moments of life can shape services provision. Serious thought is being given to how Governments can bundle some of the essential services and transactions associated with key life-cycle events, personalizing them to a certain extent so that when someone needs them, they are readily available and easy to access.

Seamless government reflects efficiency improvements at multiple levels and can take many forms. Improvements may be practical; an example would be designing automated services around key moments of life for individuals and companies so that bureaucratic processes linked to childbirth, school enrolment, marriage, retirement and business registration are streamlined and simple. Improvements may also be systemic, contributing to increased integration, connectivity and automation. Governments can shift from siloed government-to-government, government-to-

consumer and government-to-business approaches to a more holistic whole-of society approach characterized by cross-government collaboration between different institutions at all levels. In this approach, referred to as matrixed government, a common, multilayer infrastructure facilitates productive integration and coordination and proactively engages all stakeholders in the achievement of specific tasks. Invisible government is achieved when services are fully automated, with codified data-oriented processes and AI-driven applications used to complete specific bureaucratic tasks and transactions—often with no human input or interaction.

Predictive analytics and AI can play a key role in seamless governance, as they allow Governments to target likely problems before they erupt into crises. Recent advancements in natural language processing, machine learning, and speech and image recognition have made it possible for Governments to predict and anticipate rather than react to problems. From spotting fraud to combating the opioid epidemic, an ounce of prevention really is worth a pound of cure—especially in government. The idea that Governments should focus more on predicting possible future scenarios to prevent problems and strengthen crisis readiness and response is behind the concept of anticipatory government, in which public institutions are able to take action today to actively shape tomorrow. Predictive analytics is now being applied in a wide range of areas, including defence, security, health care and human services.

5.5   Digital government at the local level

The role of local government in achieving sustainable development is critical. The SDGs recognize the transformative power of urbanization for development and the strategic role local policymakers play as catalysts of change. Most of the SDGs have targets that are directly or indirectly related to life at the local level. As local institutions have greater direct interaction with residents and are more likely to engage in bottom-up governance, they are best placed to adapt development goals to local realities and ensure community investment in development processes and outcomes. They are directly responsible for realizing Goal 11—making cities and human settlements inclusive, safe, resilient and sustainable.

Analysing local public services provision offers the opportunity to conduct a deeper and more comprehensive assessment of e-government development at the granular level. The relationship between public administrators and constituents is strongest at the local level, which is important given the growing trend towards personalized, seamless government. It is critical that regional and local-level data be collected and exploited, as this can facilitate the optimal allocation of targeted resources and increase public value.

The assessment of local e-government development was first integrated in the United Nations E-Government Survey in 2018; the Local Online Services Index (LOSI) has since become an indispensable analytical tool. The 2022 LOSI is the first to assess e-government services provision in the most populous city in each of the 193 Member States. The LOSI results for the 2022 Survey are based on an analysis of 86 indicators relating to five criteria: institutional framework (a new criterion), content provision, services provision, participation and engagement, and technology. Coverage differences notwithstanding, the average LOSI value increased from 0.43 in 2020 to 0.51 in 2022.

The most recent LOSI results indicate that city portals remain less developed than their national counterparts. However, there are some strong performers at the municipal level; the more populous cities tend to have higher LOSI values overall, perhaps owing to the larger budgetary resources available and the exigencies of serving sizeable populations. A breakdown of the 2022 LOSI results reveals that the institutional framework subindex has the highest average value, followed by the content provision subindex; the lowest compliance rate is in services provision, as was the case in 2020.

UN DESA undertook a series of activities in partnership with the United Nations University Operating Unit on Policy-Driven Electronic Governance (UNU-EGOV) to further strengthen and enrich the assessment of local e-government in all Member States. The activities included LOSI disaggregated data analysis, a review of completed Local Government Questionnaires (LGQs), and additional desk research complemented by literature review.

An updated LGQ was launched in 2021 to gather additional qualitative information on e-government development efforts at the municipal level. The revised LGQ focuses on strategic areas of digital policy aimed at developing effective, accountable and inclusive local public institutions and governance. It also requests information on institutional, legal and strategy frameworks at the municipal level. The qualitative information provided by respondents indicates that many cities have formulated specific strategies and adopted new technologies for COVID-19 management, sustainable development, and evidence-based decision-making.

Various cities not included in the formal LOSI process have asked for support in assessing local e-government development, and pilot LOSI initiatives have been launched in a limited number of settings. The high level of interest suggests that there is a strong need to support cities; collaboration between various municipal authorities and organizations through the LOSI network would be extremely valuable. A well-formulated local e-government strategy can contribute to the development and consolidation of a sustainable local administration model and the achievement of the SDGs, in particular Goals 11 and 16.

Smart cities represent one of the most innovative manifestations of digital transformation at the local level. According to the International Data Corporation's 2021 *Worldwide Smart Cities Spending Guide*, use cases for IoT and machine-to-machine (M2M) technologies are growing rapidly as more stakeholders begin to explore the potential of connected objects and distributed data storage.[36] In government administration, use cases are linked to smart cities, intelligent transportation, precision agriculture, health care, and other key areas and sectors. Virtual Singapore, a government initiative, is a smart city project that incorporates IoT and M2M technologies to manage urban infrastructure and resources. The project collects data from thousands of sensors installed throughout the city, which helps to improve efficiency and reduce costs.

Smart technologies such as IoT and virtual reality are starting to transform urban centres into hubs offering efficient governance and services that can improve lives. The COVID-19 crisis has accelerated smart city development plans in many countries. Governments have had to speed up and scale up digitalization, as the pandemic has forced them to support a significant increase in demand for existing services and to provide new services—largely through digital channels.

5.6   Leaving no one behind in the digital society

With equity and inclusion emerging as core values in public administration, Governments are focusing more intently on the underlying causes of systemic imbalances and rethinking the fundamentals of how policies are developed, implemented and assessed. The new face of inequality is digital, and e-government can be the social equalizer. Efforts aimed at leaving no one behind should be driven by empathy, with Governments engaging in multilevel, multisectoral and multidisciplinary approaches and partnerships to better understand the needs of the most vulnerable. Initiatives in different parts of the world have focused on inclusive and equity-centred design, equitable access to public goods, data sovereignty and equity, and citizen empowerment for the co-creation of public value. Two approaches gaining prominence in the current context are equity innovation (innovation that promotes equity, often with multistakeholder input) and inclusive innovation (the development of services for and by those who have been excluded from the development mainstream); both approaches focus on working collaboratively to devise and implement equitable, innovative solutions that meet the needs of all members of society, in particular those who are disadvantaged and

vulnerable. While these approaches are not new, they are finding new applications and greater relevance in the digital age as public agencies seek to ensure that all members of society have equal access to services and opportunities for participation in governance.

The first step in developing solutions is to acknowledge that exclusion exists and to identify barriers to equity and inclusion in three critical areas: access (to electricity, Internet and mobile infrastructure, e-information and e-services); affordability (the ability to cover the cost of Internet access and digital devices and the availability of free public access points for e-government); and ability (traditional literacy, digital literacy and language literacy).

The second step is to prioritize and optimize data, design and delivery in e-government services development and provision. Governments need to establish an integrated framework that facilitates the exploration and adoption of evidence-driven best practices in these three keys areas. The premise "solve for one, extend to many" guides the concept of inclusive development and design, whereby individual needs are identified, and services are designed to accommodate ability limitations but are useful and beneficial for everyone. Governments should explore and exploit methodologies and practices that optimize outcomes for all, with particular attention given to data (disaggregated data, open government data and digital identity), design (co-creation and co-production and the integration of assistive technologies), and delivery (experimentation/sandboxing and blended, omni-channel services delivery). Governments should have targeted policies and dedicated budgets and resources to support the development and implementation of anticipatory, personalized services for the most vulnerable members of society, including persons with disabilities and other disadvantaged populations.

Governments should adopt "inclusion by design" or "inclusion by default" strategies, policies and regulations as an extension of the current "digital first" or "digital by default" approaches in e-government. It is important to recognize exclusion and embrace diversity as a prerequisite for activating the overarching principle of leaving no one behind.

SDG 17 calls for revitalizing the global partnership for sustainable development; the global community can engage in collaborative knowledge exchange and capacity-building to help ensure that no country is left behind in digital government.

5.7   Conclusions

United Nations Secretary-General António Guterres has referred to the Internet as a global public good, acknowledging that the Internet and digital technologies have virtually unlimited capacity to support sustainable development and the advancement of society.

Within this context, government data constitute a national public good that can be used to create public value. The growing technological capacity to process ever-larger and more complex data sets in real time has made it possible for Governments to gain key insights that allow them to make e-services more efficient, inclusive, responsive and accountable—and the foresight needed to develop anticipatory and predictive services. The potential and opportunities surrounding data are almost unlimited, and Governments should work together with all stakeholders to ensure that data are gathered, managed and utilized in ways that improve government operations and benefit all members of society.

While data have enormous potential for contributing to development, there are some risks and challenges associated with data and data-driven technologies that should not be underestimated. Governments need to be prepared to deal with issues that may arise in connection with unreliable data, existing data gaps, data security, personal privacy and ethics, and data fraud and crime. In the absence of common principles, policies and regulations governing data privacy, ethics and protection,

people increasingly worry about data breaches and the misuse or unjustified use of personal data. There are legitimate concerns about the risks associated with the handling and processing of data, particularly in the light of the current fragmented regulatory landscape. Technology is not free from risk and addressing privacy concerns and cybersecurity must be a priority in digital government development and administration.

E-government development is not the digitalization of existing bureaucracies. Examples from digitally advanced societies show that the most innovative countries and cities actively seek to eliminate points of friction between Governments and the people they serve. Making bureaucratic and sectoral boundaries permeable to strengthen integration and coordination and bringing together different societal stakeholders to collaborate on the design and implementation of innovative approaches to governance can transform the public sector—and digitalization serves to facilitate rather than define this process.

Over the past several years, the adoption of frontier technologies in the government sector has intensified, signalling an irreversible shift towards digital transformation. Digitalization is allowing Governments to redefine how they interact and collaborate with their constituents so that they are better able to identify and respond to the genuine needs of society.

Digitalization is improving the predictive capacities of Governments as well. Advancements in technology, complex systems analysis, AI and big data have allowed Governments to strengthen their anticipatory capabilities, helping them identify potential challenges and opportunities and shape future development scenarios. With anticipatory government, problems are addressed as (and in some cases before) they emerge. Ultimately, digitalization will allow Governments traditionally characterized by intrusive bureaucracy to become virtually invisible as they move towards the provision of fully automated personalized services accessible to anyone anytime from anywhere.

While the 2022 Survey results show that steady progress is being made in e-government development, they also indicate that many benefits around digital transformation have yet to be realized, especially in LDCs, SIDS, LLDCs and economies in transition. A significant proportion of countries have EGDI values that are well below the world average, with poor and uneven Internet access an important contributing factor, especially in the LDCs. Meeting the goal of leaving no one behind requires making sure that no one is left offline; in line with the SDGs, steps must be taken to ensure that all members of society—including those who are most vulnerable—have safe and affordable access to the Internet and digitally enabled services by 2030.

E-government development can play a key role in bridging digital divides. The 2022 assessment shows that digital divides persist and may widen without the adoption of targeted, systematic measures to assist low-income and lower-middle-income countries and countries in special situations (including LDCs, LLDCs and SIDS, which comprise more than a quarter of the United Nations Member States). Typically, higher-income countries tend to have higher levels of e-government development; however, there are many developing countries that have achieved high or very high levels of e-government development by improving their online services provision, despite having limited resources. This suggests that targeted investments and policies supporting e-government development can be effective in bridging digital divides in those countries.

The 2030 Agenda for Sustainable Development remains the government blueprint for building a healthier and more resilient future as society moves forward in the wake of the COVID-19 pandemic. Secretary-General António Guterres has called for a "new social contract", highlighting the need for Governments to prioritize investment in digital literacy and infrastructure to prepare society for an inclusive, sustainable digital future. The Secretary-General has emphasized that digital technology must be an enabler and equalizer—a "force for good".[37]

There has been a steady upward trend in the implementation of digital government for public services delivery, but it is not clear whether all United Nations Member States have given sufficient attention to institutionalizing digital transformation and establishing the infrastructure needed for seamless government. Government effectiveness, accountability and trustworthiness derive not only from strong public leadership, but also from a solid institutional framework built upon and guided by ethical principles, the rule of law, innovative policies, engagement with stakeholders, operational optimization, and the ability to address evolving security and privacy risks. Governments worldwide need to have a long-term national digital transformation plan supported by such a framework to ensure that Governments can meet the needs of all members of society—and leave no one behind.

Endnotes

1   United Nations, General Assembly, "Road map for digital cooperation: implementation of the recommendations of the High-level Panel on Digital Cooperation", report of the Secretary-General (A/74/81), 29 May 2020, available at https://www.un.org/en/content/digital-cooperation-roadmap/.

2   United Nations, *Our Common Agenda: Report of the Secretary-General* (Sales No. E.21.I.8), para. 92, available at https://www.un.org/en/content/common-agenda-report/assets/pdf/Common_Agenda_Report_English.pdf.

3   United Nations Conference on Trade and Development, *Digital Economy Report 2019—Value Creation and Capture: Implications for Developing Countries* (Sales No. E.19.II.D.17), p. xv, available at https://unctad.org/webflyer/digital-economy-report-2019.

4   United Nations, "Don't let the digital divide become 'the new face of inequality': UN deputy chief", *UN News*, 27 April 21, available at https://news.un.org/en/story/2021/04/1090712.

5   United Nations, E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development (Sales No. E.20.II.H. 1), addendum, p. 225, available at https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020.

6   International Telecommunication Union, "Individuals using the Internet" (figure), Statistics page, available at https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

7   Maureen Breslin, "UN estimates more than 1 in 3 worldwide have never used Internet", *The Hill*, 1 December 2021, available at https://thehill.com/policy/international/583845-un-estimates-more-than-1-in-3-worldwide-have-never-used-internet.

8   Internet World Stats, 'World Internet Usage and Population Statistics 2022 Year-Q1 Estimates' (Table), Statistics page, available at World Internet Users Statistics and 2022 World Population Stats (internetworldstats.com)

9   Centers for Disease Control and Prevention, "Vaccine Tracking System (VTrckS)", available at https://www.cdc.gov/vaccines/programs/vtrcks/index.html.

10   Priyanka Malik, "Getting digital government transformation right in a post Covid world", Whatfix website, 11 February 2021, available at https://whatfix.com/blog/digital-government-transformation-post-covid/.

11   HealthBuddy+ website, available at https://healthbuddy.plus.

12   Jared Spataro, "2 years of digital transformation in 2 months", Microsoft 365, 30 April 2020, available at https://www.microsoft.com/en-us/microsoft-365/blog/2020/04/30/2-years-digital-transformation-2-months/.

13   Australia, NSW [New South Wales] Government, Education website, available at https://education.nsw.gov.au.

14   Spain, La Moncloa, "Government sets up Hispabot-Covid19, a channel for enquiries about COVID-19 through WhatsApp", news article, 8 April 2020, available at https://www.lamoncloa.gob.es/lang/en/gobierno/news/Paginas/2020/20200408covid-assistance.aspx.

15   Organization for Economic Cooperation and Development, "3. DI in Chile", Digital government in Chile—digital identity (OECDiLibrary, 2019), available at https://www.oecd-ilibrary.org/sites/0e312f24-en/index.html?itemId=/content/component/0e312f24-en.

16   Organization for Economic Cooperation and Development and others, *Embracing Innovation in Government: Global Trends 2020*, available for download as five separate reports at https://trends.oecd-opsi.org.

17   PwC, "AI predictions 2021", available at https://www.pwc.com/us/en/tech-effect/ai-analytics/ai-predictions.html.

18   Appen, *The 2021 State of AI and Machine Learning Report*, available at https://appen.com/whitepapers/the-state-of-ai-and-machine-learning-report/.

19 Canada, "The Digital Nations", available at https://www.canada.ca/en/government/system/digital-government/digital-nations.html.

20 Open Data Charter, "Who we are", available at https://opendatacharter.net/who-we-are/.

21 Organization for Economic Cooperation and Development, "Initial insights from the Going Digital Policy Framework Questionnaire: Going Digital Steering Group Meeting—20 November 2017" (DSTI/CDEP/GD(2017)9), available at https://one.oecd.org/document/DSTI/CDEP/GD(2017)9/en/pdf.

22 India, Ministry of Health and Family Welfare, e-RaktKosh website, available at https://www.eraktkosh.in/BLDAHIMS/bloodbank/transactions/bbpublicindex.html.

23 PUBLIC, "Public confidence in accessing public services skyrockets during pandemic", press release, 13 October 2021, available at https://www.public.io/press-post/public-confidence-in-accessing-public-services-online-skyrockets-during-pandemic.

24 Laura LeBerge and others, "How COVID-19 has pushed companies over the technology tipping point—and transformed business forever" (McKinsey & Company, 5 October 2020), available at https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever.

25 Lauri Haav, "The digital transformation of government during COVID-19", Forbes, 12 April 2022, available at https://www.forbes.com/sites/forbesbusinesscouncil/2022/04/12/the-digital-transformation-of-government-during-covid-19/?sh=38399f9a2dbe.

26 Deloitte, "Digital government transformation", available at https://www2.deloitte.com/bd/en/pages/public-sector/articles/digital-government-transformation.html.

27 United States Government Accountability Office, "Information technology: agencies need to develop and implement modernization plans for critical legacy systems" (GAO-21-524T, 27 April 2021), available at https://www.gao.gov/products/gao-21-524t.

28 Lisa Rein, "Millennials exit the federal workforce as government jobs lose their allure", The Washington Post, 15 December 2014, available at https://www.washingtonpost.com/politics/millennials-exit-the-federal-workforce-as-government-jobs-lose-their-allure/2014/12/15/ea3d4418-7fd4-11e4-9f38-95a187e4c1f7_story.html.

29 Marianna Mazzuccato, "The Entrepreneurial State", PublicAffair US, 2015 pag.211.

30 https://www.borgerforslag.dk/

31 Cybercrime Legislation Worldwide | UNCTAD

32 European Union, "What is GDPR, the EU's new data protection law?", General Data Protection Regulation website, available at https://gdpr.eu.

33 Data Protection and Privacy Legislation Worldwide | UNCTAD

34 United Nations Regional Information Centre, "ITU releases fourth edition of the Global Cybersecurity Index", 30 June 2021, available at https://unric.org/en/itu-releases-fourth-edition-of-the-global-cybersecurity-index/; see also International Telecommunication Union, Global Cybersecurity Index 2020: Measuring Commitment to Cybersecurity (Geneva, 2021), available at https://www.itu.int/epublications/publication/D-STR-GCI.01-2021-HTM-E.

35 Organization for Economic Cooperation and Development and others, Embracing Innovation in Government: Global Trends 2020, Seamless Government, September 2020, available at https://trends.oecd-opsi.org/wp-content/uploads/2020/11/OECD-Seamless-Government.pdf.

36 IDC Spending Guide- International Data Corporation, Worldwide Smart Cities Spending Guide 2021 (Needham, Massachusetts, 2021)

37 United Nations, "Secretary-General's Nelson Mandela lecture: 'Tackling the inequality pandemic: a new social contract for a new era' [as delivered]", 18 July 2020, available at https://www.un.org/sg/en/content/sg/statement/2020-07-18/secretary-generals-nelson-mandela-lecture-%E2%80%9Ctackling-the-inequality-pandemic-new-social-contract-for-new-era%E2%80%9D-delivered.

The United Nations E-Government Survey 2022 is the 12th edition of the United Nations' assessment of the digital government landscape across all 193 Member States. The E-Government Survey is informed by over two decades of longitudinal research, with a ranking of countries based on the United Nations E-Government Development Index (EGDI), a combination of primary data (collected and owned by the United Nations Department of Economic and Social Affairs) and secondary data from other UN agencies.

This edition of the Survey includes data analysis in global and regional contexts, a study of local e-government development based on the United Nations Local Online Service Index (LOSI), consideration of inclusion in the hybrid digital society, and a concluding chapter that outlines the trends and developments related to the future of digital government. As with all editions, it features extensive annexes on its data, methodology and related pilot study initiatives.