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.
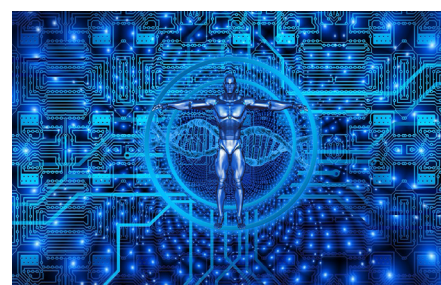
The present edition of the E-Government Survey illustrates how e-government has evolved from a siloed, technocratic approach to governance in a handful of high-income countries to a whole-of-government and whole-of-society approach undertaken in a broad range of countries; guided by its provisional title 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]
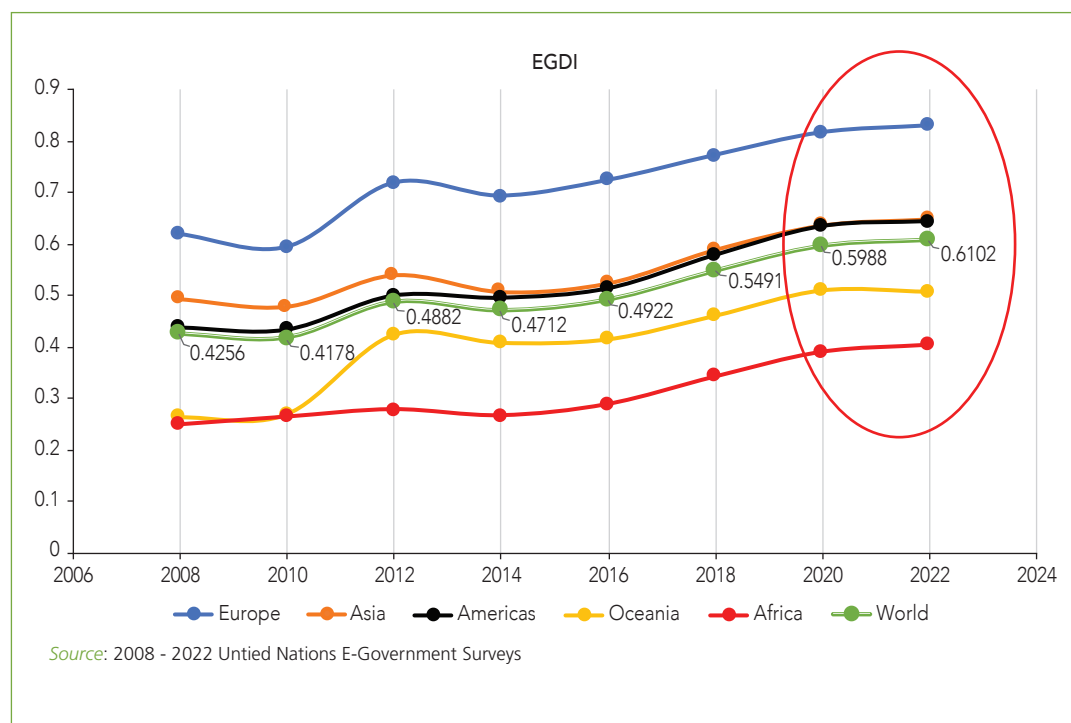
This final chapter summarizes the key findings detailed in the previous chapters and offers forecasts on the future of digital government. It examines the rise of the digital economy and the shift from an operational e-government approach to a more strategic, policy-oriented and politically driven agenda 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.
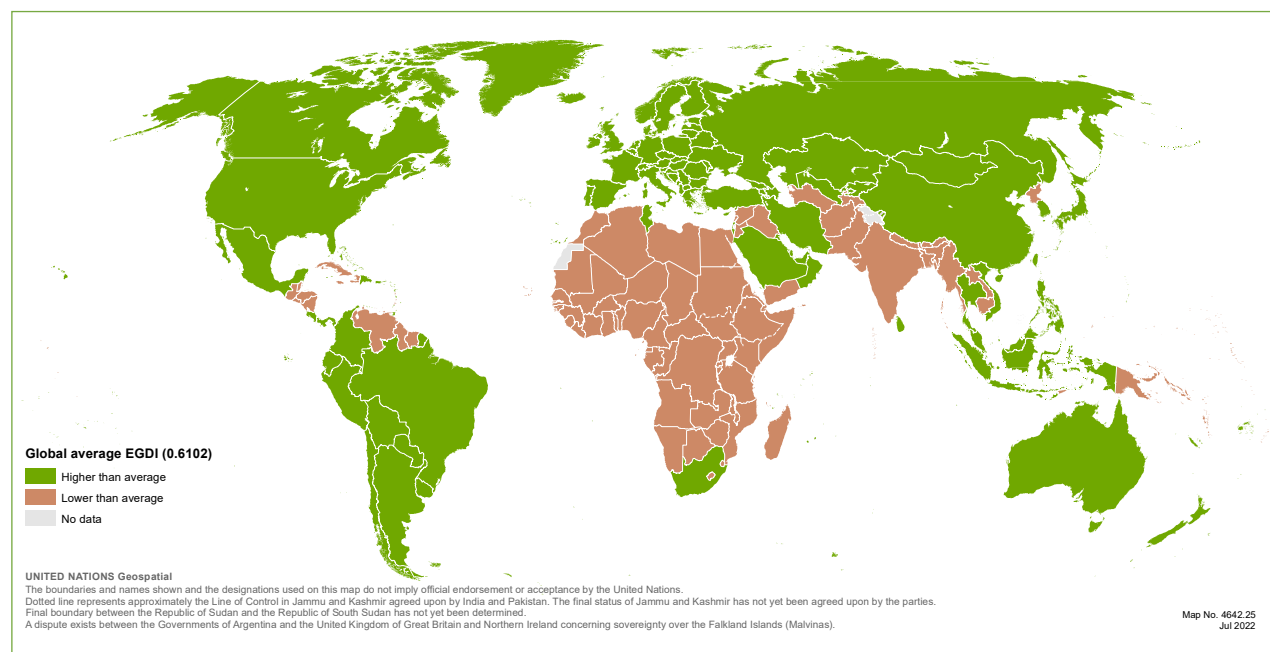
The higher overall value for global e-government development in 2022 is largely attributable to progress made in strengthening telecommunications infrastructure, though online services provision has also improved. Over the past two years, most countries have concentrated on dealing with the COVID-19 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.

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