G20 COMPENDIUM ON THE USE OF DIGITAL TOOLS FOR PUBLIC SERVICE CONTINUITY

Report for the G20 Digital Economy Task Force

Trieste, Italy, August 2021

G20 ITALIA 2·0·2·1

OECD

This document was prepared by the Organisation for Economic Co-operation and Development (OECD) Directorate for Public Governance (GOV), to inform the discussions in the G20 Digital Economy Task Force at the request of the G20 Italian Presidency in 2021. The opinions expressed and arguments employed herein do not prejudge or necessarily represent the official views of the OECD or G20 members.

Foreword

The digital transformation of our economies has accelerated significantly during the COVID-19 pandemic. Use of digital services has rapidly expanded and governments have needed to ramp up the digitalisation of existing public services as well as introduce and provide many new digital services to fight the pandemic responding to the evolving needs of households and business, and to get the recovery underway.

This unprecedented level of innovation in the public sector is very encouraging. Optimising the use of digital technologies and data will not only increase the efficiency of the public sector, it will also transform the way governments design and deliver services, in a more user friendly way, tailored to the evolving needs of our communities. People expect digitally-mature governments to seize these opportunities and shape the digital transformation to ensure everyone has the opportunity to participate and benefit, while also appropriately managing the risks associated with digitalisation.

Under its 2021 G20 Presidency, Italy made digital governance one of its priorities to build on the momentum from the pandemic and engage resolute action for sustainable, comprehensive and coherent transformation of government in the digital age. With the support of the OECD, the G20 Digital Economy Task Force (DETF) advanced the global debate on how to address the digital transformation of our governments from three crucial perspectives: digital tools for public services and their continuity, digital identity and agile regulatory governance to harness innovation.

Furthering the work undertaken by the previous Presidencies of Argentina and Japan, with the G20 Digital Government Principles, and the G20 AI Principles, this renewed momentum around digital government in the G20 will pave the way for ambitious collective action and build on the key messages emerging from the evidence and analysis in these three reports:

1) The "**G20 Compendium on the use of digital tools for public service continuity**", with 120 practices collected across G20 members, indicates how governments can significantly transform themselves and make the best use of digital technologies, such as AI, and data to better serve societies and economies, learn from each other and accelerate the development of most successful use cases. Focusing on the quality, sustainability and trustworthiness of digital government services would be a natural way forward for the G20.
2) The "**G20 Collection of Digital Identity Practices**" highlights how digital identity is a core 21st century service for mature digital government and developing trusted citizen-to-Government relationships as it can grant people access the services they need, wherever and whenever they need them without any friction or impediment. Much remains to be done for portable digital identity solutions that can be trusted by all. This foundational stock-taking exercise, initiated by Italy is conceived as an initial stepping stone to improve access to all, with the long term objective of cross-county interoperability.
3) The "**G20 Survey on Agile Approaches to the Regulatory Governance of Innovation**" showcases ongoing efforts of G20 governments to revisit how they regulate in this fast-paced global innovation landscape. It also leveraged the OECD Recommendation on Agile Regulatory Governance to Harness Innovation as a tool for governments to fully benefit from the power of innovation while better managing their potential unintended consequences, through transparency, experimentation and shorter regulatory cycles.

To optimise the strength and the quality of the COVID-19 recovery, we need to facilitate the digital transformation of the public sector with forward looking future oriented governance structures. This crisis has forced all governments to rethink how they operate, regulate and interact with their citizens, and to accelerate deployment of digital public services and applications at a speed and scale unimaginable before the pandemic. Governments should sustain these transformational efforts in the long run. It will make them more agile, responsive, inclusive, innovative, trustworthy and better equipped to respond to future global threats. The newly established G20 Digital Economy Working Group is well placed to further these initiatives by sharing impactful and exemplary deployments and approaches. The government of Italy and the OECD stand ready to build on these foundations with future G20 Presidencies.

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Acknowledgements

The Compendium was produced under the leadership of Elsa Pilichowski, Director of GOV, by the Digital Government and Data Unit – Open and Innovative Government Division (GOV/OIG), under the supervision of Barbara-Chiara Ubaldi, Acting Head of the GOV/OIG Division and Head of the Digital Government and Data Unit, and Jacob Arturo Rivera Perez, Policy Analyst and Data-Driven Public Sector Lead from the Digital Government and Data Unit.

Ethel Hui Yan Tan and Alex Seemann, Junior Policy Analysts from the Digital Government and Data Unit, were the main authors of the Compendium. All sections benefitted from the strategic review of Barbara-Chiara Ubaldi, Jacob Arturo Rivera Perez and Charles Baubion, Advisor, Director's Office of GOV. OECD colleagues from GOV's Regulatory Policy Division, the Directorate for Science, Technology and Innovation and the Sherpa Office and Global Governance Unit provided comments.

This Compendium would not be possible without the unwavering support of the G20 Italian Presidency led by Daniela Grazia Battisti, Filippo Pierozzi, Pietro Morandini and Elisabetta Oliveri, and active contributions and feedback from the G20 members and guest countries.

Executive summary

This Compendium takes stock of the use of emerging technologies such as artificial intelligence (AI), fifth-generation mobile telecommunication technologies (5G), and the Internet of Things (IoT) across G20 members to sustain public service continuity and provide the basis for recovery from the COVID-19 crisis.

It responds to the expressed interest of the G20 Digital Economy Task Force (DETF), under the leadership of the 2021 G20 Italian Presidency, to consider the experiences of and responses taken by G20 members to best leverage emerging technologies to improve governments' competence and sustain the continuity of public services amidst instability and shocks. For this purpose, this Compendium also highlights the relevance of the ***G20 Digital Government Principles*** for establishing digital governments that are people-centred and take comprehensive action to build digital maturity.

The COVID-19 pandemic pushed governments to make the transition from physical and analogue services overnight in order to provide a sense of continuity and stability to citizens, secure their safety and respond to their needs, including those of the most vulnerable.

The unprecedented speed and scale needed of the policy response challenged governments' capacities and capabilities to meet the urgent societal needs in sectors such as healthcare, education and social welfare, while securing their continuity. Contact tracing and self-diagnosis applications, digital certificates for vaccinations and tests, the use of AI for diagnosis, digital platforms to enable access to welfare assistance, and the release of open data and open source tools are just a few examples in the myriads of innovative and digitally-enabled practices that G20 members set up in the last 18 months.

This Compendium gathers around 120 practices across G20 members, demonstrating how governments have been laying the foundations and then seized the opportunities presented by the COVID-19 pandemic to boost public sector competence, and transform public services for the benefit of citizens and businesses. The Compendium pays particular attention to the enablers of digital government maturity (i.e. governance, regulations, standards, principles, openness, being user-driven, talent and skills), which are fundamental to securing the capacity and capability for the digital transformation of governments.

The following key messages can be derived from the evidence presented in the Compendium:

- **Digital tools and platforms provided the most optimal way for governments to improve and secure their continuity in the face of major disruptions.** The availability of previous digital government efforts proved fundamental in securing governments' ability to respond effectively.
- **The adoption of emerging technologies increased amidst the emergency, as governments were pushed to innovate** across the various stages of the pandemic (from outbreak to vaccination efforts). The continuity and sustainability of these efforts will prove to be pivotal in the long run.
- **Governments had to be resourceful and further tap on the value of data to design and deliver public services.** Securing sound data governance and streamlining data access and sharing, across sectors and as open data, are crucial to better respond to future emergencies.
- **Having a digital government ecosystem that leverages open source and common tools** is essential in enabling collaborations in the form of co-creation, co-delivery and the scale up of public services that reach and meet the needs of all users.
- **The use of digital tools by governments goes together with public trust.** The adoption of rules and standards on ethics, transparency, privacy and security is central to ensuring a human-centred approach to the deployment of digital technologies and data in the public sector and beyond.

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1 Background and rationale

1.1 Background: Global policy context on the use of digital tools in public service design and delivery

Recognition of the crucial role of information and communication technologies (ICT) in modernising and increasing the efficiency and efficacy of public administration was given under the 2017 G20 German Presidency, which built on the growing awareness of the value of digitalisation for economic and social development under the 2015 Turkish Presidency and 2016 Chinese Presidency (BMWi, 2017[1]).

On this basis, G20 Digital Ministers committed to collectively leverage digital opportunities through the **G20 Digital Government Principles** and promote an agile, innovative, integrated and data-driven public sector that enhances the effectiveness and performance of governments, and contributes to the development of the digital economy, including through public services (G20 Research Group, 2018[2]). Developed under the 2018 Argentinian Presidency and with the support of the OECD, the G20 Digital Government Principles aim to guide the action of policy makers in promoting public administration modernisation with ICT in G20 members (see Box 1.1).

Furthermore, continuous technological advancement led the 2018 Argentinian Presidency and the 2019 Japanese Presidency to broaden discussions on the use of emerging digital technologies such as AI, 5G, IoT and distributed ledger technologies in creating opportunities for the benefit of citizens and businesses. As a result, G20 Digital Ministers committed in 2019 to provide an environment that enables the responsible development and use of human-centred AI to improve economies and societies (METI, 2019[3]).

In order to materialise this human-centred approach to AI, G20 Leaders welcomed the **G20 AI Principles** under the 2019 Japanese Presidency. Drawing on the OECD Recommendation of the Council on AI (2019),[1] the G20 AI Principles aim to offer guidance to policy makers to enable the responsible development and use of AI in governments, economies and societies (see Annex D). To advance on the implementation of the G20 AI Principles, G20 members shared examples of national AI policies,[2] noted in the 2020 G20 Digital Economy Ministerial Declaration adopted under the Saudi Presidency. Discussions also focused on the application of AI in health and education, covering essential aspects of public service design and delivery (G20 Research Group, 2020[4]).

[1] See https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449.

[2] See: https://mcit.gov.sa/sites/default/files/examples-of-ai-national-policies.pdf.

This ambitious G20 digitalisation agenda is aligned with existing global and regional agendas, namely in the Africa Union (AU),[3] the Association of Southeast Asian Nations (ASEAN),[4] the Digital Nations (DN),[5] the European Union (EU),[6] the Network of e-Government Leaders of Latin America and the Caribbean (GEALC Network),[7] the OECD,[8] the United Nations (UN),[9] and the World Bank.[10]

[3] AU Member State South Africa is a G20 member. In 2019, AU Ministers of Communication and Information Communication Technology (CICT) and Postal Services elected a Specialised Technical Committee on Communication and Information Technologies (STC-CICT) to promote the implementation of Declarations on the adoption of ICT and postal services for an integrated and inclusive digital economy and society. See: https://au.int/sites/default/files/decisions/37590-2019_sharm_el_sheikh_declaration_-_stc-cict-3_oct_2019_ver2410-10pm-1rev-2.pdf.

[4] ASEAN Member State Indonesia is a G20 member. Other G20 members Australia, Canada, China, France, Germany, India, Italy, Japan, the Republic of Korea, Russia, Turkey, the United States and the EU are key partners of ASEAN. ASEAN produced a policy strategy and action plan in 2021, the ASEAN Digital Masterplan 2025, that places digital services (private and public) at the centre of supporting the COVID-19 recovery (e.g. increasing the quality, relevance and use of e-government services; delivering best practice guidance on AI governance and ethics, IoT spectrum and technology) and shapes digitalisation towards inclusive, productive, innovative, prosperous and resilient economies and societies. See: https://asean.org/storage/ASEAN-Digital-Masterplan-2025.pdf.

[5] DN member countries Canada, Mexico, the Republic of Korea and the United Kingdom are G20 members. DN Ministers adopted in 2018 the Shared Approach for the Responsible Use of AI by Governments with shared goals to understand and measure the impact of using AI openly and transparently, with clear user need, public benefit and meaning explanations about AI decision-making, and to provide training to public officials developing AI-based public services. See: https://www.leadingdigitalgovs.org/artificial-intelligence.

[6] EU is a member of the G20. EU's Tallinn Declaration on eGovernment (2017) and Berlin Declaration on Digital Society and Value-Based Digital Government (2020) have been key political and policy instruments to advance the modernisation of public services based on agreed principles and policy action lines that draw on EU eGovernment Action Plans (2006-2010; 2011-2015; 2016-2020). Recent legislations and proposals that address the digital and data governance include the General Data Protection Regulation (Regulation (EU) 2016/679), Cybersecurity Act (Regulation (EU) 2019/881), Open Data Directive (Directive (EU) 2019/1024), Data Governance Act (COM/2020/767) and the Proposal for a Regulation on a European approach for AI (COM/2021/206).

[7] GEALC Network members Argentina, Brazil and Mexico are G20 members. GEALC Network's 2020 Ministerial Declaration of San José emphasised the essential role of digital transformation for the region's inclusive economic and societal response to the COVID-19 crisis and highlighted the transformative power of digital government as an enabler of more efficient, transparent and participatory public administrations in the provision of public services especially during emergencies. See: https://www.redgealc.org/site/assets/files/12437/declaracionministerialsj2020-3.pdf.

[8] OECD member countries Australia, Canada, France, Germany, Italy, Japan, the Republic of Korea, Mexico, Turkey, the United Kingdom and the United States, and OECD key partners Brazil, China, India, Indonesia and South Africa are G20 members. OECD has been supporting governments on the formulation of digital government, data and AI strategies, including analysing the features of digital government maturity and the strategic and trustworthy use of data and AI for the design and delivery of services. Relevant OECD standard-setting work in this regard include the OECD Recommendation of the Council concerning Guidelines governing the Protection of Privacy and Transborder Flows of Personal Data (2013), the OECD Recommendations of the Council on Digital Government Strategies (2014) and on AI (2019), the ongoing work to develop a set of general principles for Enhancing the Access to and Sharing of Data, and the Good Practice Principles for Data Ethics in the Public Sector. Other relevant OECD policy and measurement work include (i) the OECD AI Policy Observatory, (ii) the work on AI by the Observatory of Public Sector Innovation, (iii) the Going Digital Toolkit, (iv) the Digital Government Index and the OECD Digital Government Policy Framework; (v) the OECD Framework on the Governance of Digital Government; and (vi) the Open, Useful and Re-usable Data (OURdata) Index and the Data-Driven Public Sector Framework.

[9] UN Member States Argentina, Australia, Brazil, Canada, China, Germany, France, India, Indonesia, Italy, Japan, Mexico, the Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey, the United Kingdom and the United States are G20 members. UN launched a joint effort in 2019 between the International Telecommunication Union (ITU) and more than 35 UN agencies and bodies to address how the UN system and partners of the AI for Good Global Summit are using AI as a force for good to tackle the many complex challenges that countries face such as food security, humanitarian crises, healthcare for all, job displacements, algorithmic bias and climate change, towards meeting the UN Sustainable Development Goals. See: https://www.itu.int/dms_pub/itu-s/opb/gen/S-GEN-UNACT-2019-1-PDF-E.pdf.

[10] World Bank's Digital Development Toolkit Series was designed to help identify gaps in policy and regulatory actions in digital development and present potential solutions supported by country examples – which include the Broadband Strategies Toolkit, Cross-Sector Infrastructure

1.2 Purpose of the Compendium

The outbreak of the COVID-19 pandemic has demonstrated the importance of being able to count on mature digital governments to serve economies and societies with continuity, including during challenging times. Building on the ambitious agenda for digital government set by the G20 and counting on the other aforementioned global and regional agendas, it is vital to gain a deeper understanding of the state of play in terms of approaches to the use of digital tools for design and delivery of public services that respond to changing needs and demands, including the establishment of underlying prerequisites such as the adoption of principles and the deployment of key enablers (e.g. governance, regulations, standards).

In light of the above, this Compendium presents practices from G20 members[11] showing how national governments and international entities like the EU took action to secure the continuity of public services amidst the COVID-19 pandemic by using digital tools and data. Although differences in practices preclude the identification of "one-size-fits-all" solutions, common experiences show how the establishment of solid foundations for mature digital governments is critical to secure returns on digital government investments and the delivery of public value to economies and societies through better services.

1.3 Methodology and structure of the Compendium

The practices by G20 members presented in this Compendium draw upon the following three methods:

- The information on the practices gathered by the OECD Secretariat through a targeted data collection exercise with G20 members that was conducted for the purpose of this Compendium. The data collection exercise asked countries to submit information on practices at the national and international level showing how digital technologies and data supported COVID-19 related public services to provide the basis for future recovery. The information gathered through this data collection exercise, as provided originally by G20 members, is presented in **Annex C**;
- The evidence available through OECD policy research and analysis work on digital government, connectivity and AI, including from the Observatory of Public Sector Innovation, the OECD AI Observatory and other data collection exercises at the EU level, including the survey on AI use by the public sector co-ordinated by the European Commission Joint Research Centre (European Commission, forthcoming[5]);
- The information gathered from secondary research performed for the purpose of this Compendium to complement the information from the data collection exercise with G20 members and the evidence from OECD and EU policy research and analysis work.

This collection of practices have been organised into two groups and catalogued as follows:

1. Practices G20 members leveraged and/or put in place in response to the COVID-19 pandemic in order to secure the continuity of services. This group of practices is summarised in **Annex A** and draw upon a selection of practices from the aforementioned three methods.
2. Other practices G20 members have developed that have contributed to the overall digital maturity of governments. This group of practices is summarised in **Annex B** and similarly draw upon a selection of practices from the aforementioned three methods.

Sharing Toolkit, Cloud Readiness Assessment Toolkit, Engendering ICT Toolkit, Digital Government Readiness Assessment Toolkit and Digital Capabilities Knowledge Map. See: https://www.worldbank.org/en/topic/digitaldevelopment/brief/digital-development-toolkits.

[11] G20 guest country Singapore is also included in the collection of practices.

The Compendium focuses on two core topics, namely i) how digital maturity in governments contribute to building and delivering better public services that respond to people's needs (covered in Section 2.2), and ii) the key enablers that governments can work upon to build digital maturity (covered in Section 2.3).

Box 1.1. G20 Digital Government Principles

The G20 Digital Government Principles aim to facilitate an inclusive and whole-of-government approach to the use of ICT and assist governments in reshaping their capacities and strategies, while respecting the available frameworks of different countries including with regards to privacy and data protection.

Services

Foster user-driven and inclusive approaches to Digital Government, beginning with user needs and designing services that meet those needs. Foster the use of data and digital technologies to facilitate user-driven approaches in the design of digital processes, products and services, which are accessible, affordable, and accommodate the needs of all users across society. Encourage the adoption of ways to collect users' feedback and promote the inclusion of citizens in the design of digital services wherever possible.

Data

Promote an open and data-driven culture in the public sector. Promote the use of data as a key strategic asset to improve foresight, service delivery, and projects' and programme' performance. Support the appropriate use, re-use and access to government data by the public, the private sector, and civil society to increase openness, transparency, and accountability. Improve dataset quality and interoperability, and incentivise public understanding and engagement in policy making, service design and service delivery to foster innovation and encourage public value co-creation.

Security

Promote trust and security, as vital for harnessing the potential of digital government, by adopting a risk management approach for appropriate uptake of digital technologies to address security risks, data loss concerns, privacy, threats and vulnerabilities in the use of ICT. Adopt risk management models to identify, assess, monitor, mitigate and manage risks as well as promote resilience and security of systems. Foster the adoption of reliable identity and trust management approaches. Promote international co-operation in regard to this matter.

Digital Skills

Strengthen the readiness of public servants, citizens and businesses for Digital Government. Reduce the digital divide by taking steps to further increase the readiness of public servants, businesses, and citizens to interact digitally with each other by promoting digital skills, digital literacy and the availability of digital public services. Promote public-private partnerships when beneficial.

Standards

Foster the application of digital government standards developed using principles of openness, transparency, and consensus. Provide enabling frameworks for Digital Government to seize new opportunities by leveraging industry- and market-led standards, by using international standards and recognising countries' different contexts, to provide governments fit-for-purpose solutions to achieve their digital government objectives.

Strategy

Prioritise and facilitate funding and implementation of digital government strategies. Facilitate the formulation of business cases that identify expected economic, societal and policy benefits of implementing digital government strategies and a common methodology to monitor and/or report back, to enable communication on public investments, including government procurement, shared accountability across the public sector and improved project and programme management.

Evolution

Establish a framework to commission digital technologies and services in ways that accommodate the fast-paced change in the digital environment. Provide standards for the commission (design, build and buy) of digital technologies, ensuring processes are compatible with modern ways of developing and deploying digital technologies across the public sector. Apply these principles to end-to-end procurement and contracting in digital, data and technology products and services in support of digital government evolution.

Source: (G20 Research Group, 2018[2]), *G20 Digital Economy Ministerial Declaration.*

2 Building digital government maturity for public service continuity

2.1 Introduction

Strengthening digital government maturity is fundamental to creating public value[12] and supporting the delivery of public services amidst instability or shock. By embracing the strategic use of digital tools and data, governments can make public services more responsive to citizens' demands while optimising public resources and securing the continuity of governments' operations. As a result, international policy research and measurement work on e-government and digital government, like the UN E-Government Development Index (EGDI), the OECD Digital Government Index (DGI) (OECD, 2020[6]) and the European Commission Joint Research Centre (Misuraca and Van Noordt, 2020[7]) place public service design and delivery at the core of public sectors' digital transformation worldwide.

Yet, the urgent economic and societal needs that emerged from the COVID-19 pandemic offered little time and space for governments to build the right enablers (e.g. governance, culture, regulatory frameworks for digital tools and data, including AI and digital identification). Therefore, establishing these enablers that build the systemic competence to fully tap on the value of digital tools and data and secure the continuity of public sector operations and the delivery of services even during emergencies is to be considered a priority to strengthen governments' accountability and responsiveness in the digital age.

Section 2.2. exemplifies the case for unlocking the cross-cutting value of digital tools and data as a means to reinforce public trust through user-driven, inclusive, accessible, resilient, sustainable, innovative, trustworthy and secured public services, in line with the G20 Digital Government Principles 1, 2 and 3 (i.e. *Services*, *Data*, *Security*).

Section 2.3 introduces the key enablers of digital government and their value for continued provision of core public services or the development of new ones to respond to emerging needs during shocks, or crisis situations. It discusses the relevance of governance (including institutional, legal, funding), collaboration (including ICT/digital procurement), culture and skills as enablers of efficient policy responses for service continuity, in line with the G20 Digital Government Principles 4, 5, 6 and 7 (i.e. *Digital Skills*, *Standards*, *Strategy*, *Evolution*).

Relevant practices from G20 members are embedded throughout Section 2.2 and 2.3 to show how the adoption of strategic approaches to the use of digital tools and data and the key enablers are critical for sustaining public services (before and during the COVID-19 crisis). **Section 2.4** specifically showcases the practices by G20 members in response to the COVID-19 pandemic to secure the continuity of public services and presents observed trends in these practices.

[12] Refer to OECD Recommendation of the Council on Digital Government Strategies (2014) for a definition of public value.

2.2 Digital maturity in governments: Enabling the provision of better services

User-driven public services

In transitioning from e-government to digital government, G20 members have put in place different initiatives that aim to improve users' access to and experience with public services. Some of them involve the creation of single-access portals. **Turkey**'s e-Government Gate was created to improve public service provision by allowing citizens to access to hundreds of applications through a single platform[13]. Examples of these single-access points can be observed in other G20 members such as the **United Kingdom** (GOV.UK)[14] and **Mexico** (Gob.MX).[15] **Russia** developed the Unified Public Service Portal (UPSP) that provides information to citizens and businesses on digital services delivered by state and municipal institutions. Based on the federal register of state and municipal services, UPSP users can access customised digital services according to their personal status, including social benefits and transfers. Building on the UPSP, the government of Russia developed the Superservice platform, which offers digital services on a broad range of topics with the Digital Profile function that integrates data on individuals to improve the quality and consistency of data handled by the government.[16]

Yet, becoming digitally mature calls not only for the creation of these portals, but working on the quality of the services from the perspective of the users. Being user-driven features strongly as a core policy issue in the G20 Digital Government Principle 1 on *Services.* The full benefits of digital tools in creating public value can be secured when users' needs and outcomes are the focus of public service design and delivery.

Given that public services directly concern people's well-being, the stakeholders of the services (including users and representatives from the public sector, private sector and civil society) would naturally appreciate transparency, reactivity and sensitivity from the government to be able to understand, monitor, challenge and improve the design and delivery process (be it around efficacy or integrity). By inclusively integrating users' needs and insights in the service lifecycle (from research and design to delivery and monitoring), the public sector can become more effective, open, responsive, accountable and relatable. This helps to increase and sustain citizens' trust in public institutions, due to improved user experience, communication, and perception of government competency in understanding and meeting societal and individual needs.

Enabling such openness for stakeholders to participate freely in the design and delivery process is a central and necessary principle for building user-driven services and strengthening public trust in the long run. It demonstrates governments' commitment to listening, taking into account and acting upon a diversity of stakeholders' thoughts and experiences to make public services truly helpful for users, and increases the governments' capacity to deliver responses that better address user needs.

In this context, digital tools – including AI, 5G, and IoT – and data (as featured in the G20 Digital Government Principle 2) – offer great potential for governments to be user-driven, responsive and open.

Whether they are digital platforms for participation and engagement (see **France**'s Citizens' Convention for the Climate, an online platform for public participation[17]); a service delivery strategy where users can access public services through different channels, including digital ones (elaborated in the next sub-section

[13] See: https://www.turkiye.gov.tr/.

[14] Based on the information provided by the country through the data collection exercise. See Annex C.

[15] See: https://www.gob.mx/.

[16] See: https://www.gosuslugi.ru/superservices.

[17] See: https://contribuez.conventioncitoyennepourleclimat.fr/.

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"Inclusive and accessible public services"); the use of IoT to generate, collect and use data to inform better health services (see **South Africa**'s Electronic Bed Management System, eBMS)[18]; the development of AI tools such as chatbots to provide information or help individuals to self-diagnose in response to the COVID-19 pandemic (see those developed by **Argentina**,[19] **France**,[20] **Germany**,[21] **India**[22] and **Mexico**[23]); or the use of facial recognition and biometrics to secure access to social benefits (see **Brazil**'s Proof-of-Life for social security benefits[24]), governments now have the option and possibility to better interact with users on an individual basis and provide services that meet their specific needs. **Turkey**, for instance, uses an AI/machine learning (ML)-powered platform named e-Triage to customise user experience in health facilities, adapting the provision of services according to the information provided by users.[25] These user-driven and user-centric approaches strengthen digital governments by making them more reliable and capable in anticipating and responding to economic and societal demands at a macro and micro level proactively and dynamically.

Inclusive and accessible public services

Inclusiveness features as another core policy issue in the G20 Digital Government Principle 1 *Services*. Being inclusive, on top of and integrated into user-driven approaches, means ensuring that all segments of the population participate in the design and delivery process, access, and benefit from public services, through both digital and non-digital channels and means.

Firstly, the service experience must be designed in such a way that the channel chosen by the citizen has no effect on the quality and convenience of the outcome, be it face-to-face, digital, or analogue. Securing an omni-channel strategy for public services is an additional driver of inclusiveness. When public services are accessible across all available channels, and provided with the same quality and convenience, all citizens can benefit from public actions regardless of their preferred delivery channel or their level of digital skills. An omni-channel strategy implies that digital is not the main channel, but an additional channel for public service delivery (OECD, 2020[8]). In **Argentina**, the creation of a specific WhatsApp-based chatbot function allows for women to report gender violence during the COVID-19 pandemic in a safe and secure way as a complement to the traditional phone-based channel (Linea 144).[26]

Additionally, evidence from the 2020 UN E-Government Survey showed that helping the most vulnerable groups in society has remained a challenge for governments amidst the COVID-19 pandemic, particularly as vulnerable groups such as migrants and refugees "often have limited access to technologies and live in remote areas, and, therefore, have difficulties accessing information or support during the crisis" (United Nations, 2020[9]). In this light, a dimension directly related to inclusiveness is accessibility, which implies that all population segments including those with limited access to technology (e.g. homeless, low income,

[18] See: https://www.gov.za/speeches/gauteng-health-introduces-electronic-bed-management-system-19-apr-2016-0000.

[19] See: https://www.argentina.gob.ar/noticias/sumamos-whatsapp-ante-la-emergencia-sanitaria.

[20] See: https://info.covidbot.fr/.

[21] See: https://chatbot.it.bund.de/.

[22] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26858.

[23] See: https://www.gob.mx/cms/uploads/attachment/file/547629/CP_Salud_Chat_Susana_Distancia__21abr20.pdf.

[24] Based on the information provided by the country through the data collection exercise. See Annex C.

[25] Based on the information provided by the country through the data collection exercise. See Annex C.

[26] See: https://www.argentina.gob.ar/noticias/ampliamos-nuestra-capacidad-de-atencion-de-la-linea-144-whatsapp.

elderly, young, migrants, refugees, people with special health or mental needs) should also contribute to the design and delivery process of public services, access and use them as necessary.

To improve accessibility, digital tools such as voice recognition are increasingly embedded into websites for services (see the case of the National Health Systems Resource Centre in **India**[27]) or used to facilitate response in case of emergencies (see the case of the **United States**' Department of Homeland Security Science and Technology Directorate[28]). In **Argentina**, the digitalisation of the International Symbol of Access (ISA) allowed people with disabilities to digitally generate the ISA and have it accessible through the MiArgentina app, thereby moving towards more inclusive services that meet the needs of specific population groups.[29] Related to the ease of accessibility is also efficiency and timeliness of the service delivery. The **United States**' Social Security Administration deployed AI-based technology to improve internal efficiencies and shorten the adjudication response timeframe on their social security programmes, including the Social Security and Disability Insurance for medically impaired workers.[30]

It is critical to be inclusive and accessible at every stage of the process and through the user journey from end-to-end: surveying and researching users' needs, deploying digital and non-digital tools for delivery, consulting and collecting feedback. One concrete and effective way to secure inclusiveness effectively is to enable the extensive involvement and active engagement of a wide pool of stakeholders so that no one's insights are "left behind". **China** has been promoting digital inclusion in Hebei Province by leveraging collaborations with the ITU and other partners in the ecosystem to improve regulatory frameworks, ICT and financial markets infrastructure, and provide training for agriculture and e-commerce platforms.[31]

At the same time, connectivity, quality of internet access and digital maturity across the population play a key role in securing access to digital services, especially during emergencies. In **Brazil**, according to information provided by the central government, the COVID-19 pandemic led to the digitalisation of more than 40 public services in high demand that were previously offline, including in areas such as agriculture and livestock, the National Film Industry and health services.[32]

In light of the above, the increasing testing and deployment of Wi-Fi public access points and 5G networks by G20 members – including for instance 5G plans in **Australia**, **Brazil**, **Canada**, **China**, the **EU**, **France**, **Germany**, **Italy**, **Japan**, the **Republic of Korea**, the **United Kingdom**, the **United States** (OECD, 2019[10]) and **Turkey**[33] – opens new opportunities for more inclusive, accessible and responsive digital services. **Italy**'s Support Programme for Emerging Technologies based on 5G offers an example of government backing in this regard.[34] Under the framework of the federal project "Information Infrastructure", **Russia** aims to develop infrastructure for Internet connectivity and connect socially important facilities to the Internet, including rural educational and health centres, cultural centres and local governments, among others. Part of this includes deploying 5G networks in 10 cities with a population of one million.[35]

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[27] See: http://nhsrcindia.org/speech-recognition-support.

[28] See: https://www.dhs.gov/publication/st-automated-speech-recognition-technology-hands-free-solutions-first-responders-fact.

[29] See: https://www.argentina.gob.ar/noticias/el-simbolo-internacional-de-acceso-ahora-es-digital.

[30] See: https://www-cdn.law.stanford.edu/wp-content/uploads/2020/02/ACUS-AI-Report.pdf.

[31] See: https://www.itu.int/net4/wsis/stocktaking/Prizes/2021/Winners.

[32] Based on the information provided by the country through the data collection exercise. See Annex C.

[33] See: https://5gtrforum.org.tr/en.

[34] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24914.

[35] See: https://digital.gov.ru/ru/activity/directions/870/.

Additionally, investing in a robust data governance is essential to enable inclusiveness. It can help to secure not only the integrity of the data generated by public sector organisation as a result of public services' use and performance monitoring, but it can also ensure that the data used in decision-making and service design are representative of all population groups and their needs. **Canada** published disaggregated data on gender, diversity and inclusion in relation to the COVID-19 pandemic.[36] In this specific case of representation, governments need to ensure that possible biases in the generation and extraction of data are minimised through risk-management approaches. Embracing the diversity and inclusiveness of teams and approaches is one reliable method for mitigating biases.[37]

Challenges related to legacy data in the public sector, and the inclusiveness of how data are generated, accessed, shared and used by public sector organisations is fundamental to address from the outset. Fairness and inclusiveness in the use of data for service design and delivery requires not only granting data subjects including citizens control over their data, and the tools to exert that control, but to make sure that data and the decisions that they inform are inclusive, equitable and fair.

Resilient and sustainable public services

On the point of resilience and sustainability, the COVID-19 pandemic surfaced the importance of digital maturity for efficient emergency response, demonstrating how the use of digital tools and data can increase public sector organisations' preparedness and agility to react to risks and uncertainty rapidly (i.e. resilience), and secure the continuity of public services (i.e. sustainability).

During the COVID-19 crisis, public welfare, social support and financial systems were stretched to address citizens' urgent needs and counterbalance the economic and social consequences of the sanitary crisis, including through the development of new digital services. In this context, the digital transformation of the public sector became a political priority overnight and governments drew upon the available enablers and digital tools as a means to adapt the way public services operate, interact and deliver to its constituencies. Yet, governments should also consider the sustainability of these enablers and services that were built up in a short time frame – whether they are financially sustainable (i.e. financing apart from emergency funds), operationally sustainable (i.e. the processes are not just implemented in a crisis) or environmentally sustainable (i.e. alignment with the protection of the environment).

Building digital government maturity with a long-term perspective fosters public service resilience to exogenous shocks such as natural disasters or sanitary emergencies and secures provision in times of disruption. For instance, an omni-channel delivery of services decreases dependence on a particular channel of operation and, as a result, improves national risk management and societal resilience.

Moreover, digital tools, data access and sharing allow governments to better resource themselves to cope with shocks and inform their decisions in order to keep public services operational, relevant, responsive and reliable, while promoting an active engagement with relevant stakeholders. In addition, data provide an ideal platform for the co-design and co-delivery of public services and to ensure resilience and continuity, in particular in light of restricted resources and urgency. Evidence gathered by the OECD and The GovLab showed that during the initial stage of the COVID-19 pandemic, governments were active in promoting open government data (OGD) to enhance public communication efforts but did not prioritise efforts towards data re-use for the design of new services (OECD & The GovLab, 2021[11]).

[36] See: https://www.statcan.gc.ca/eng/topics-start/gender_diversity_and_inclusion.

[37] For more information, see the Good Practice Principles for Data Ethics in the Public Sector (2020): https://www.oecd.org/gov/digital-government/good-practice-principles-for-data-ethics-in-the-public-sector.pdf.

Innovative public services

The digital transformation of the public sector is not a one-time exercise. Innovation is essential to fully tap on the potential of digital tools and data in public service design and delivery. Yet, creating public value through innovation is complex and challenging for governments due to the uncertainty and potential risks generated from experimenting with new ways and means to achieve public ends (OECD, 2017[12]), and the funds and resources governments need to set apart for this purpose – as done with **Italy**'s Blockchain, AI and IoT fund that aims to foster a digital ecosystem for AI[38].

An iterative transformation allows governments to adapt and respond early and better to the needs of their citizens, and reduces the risk of resorting to costly systemic transformations that can affect the continuity of services. As technology evolves and the availability of new data sources explodes, governments should find sustainable and suitable iterative digital transformation strategies that allow them to remain relevant, responsive and reliable.

Examples of the adoption of voice-based technologies across G20 members[39] for public service delivery, or **Turkey**'s application of AI/ML techniques to analyse risk and detect anomalies in foreign trade,[40] use of web scraping and natural language processing (NLP) techniques to monitor prices online and produce official statistics,[41] and use of AI in the detection of several pathologies such as brain anomalies, breast cancer and liver through medical imaging[42] are proof of how governments could embrace innovation in different policy areas in order to meet the dynamic needs of citizens, and thus securing the relevance of those services in light of changing societal needs and new challenges.

Trustworthy and secured public services

Digital tools provide massive opportunities for governments to improve their interactions with citizens and business (e.g. data analytics, chatbots) and enhance governments' reliability to provide better public services (OECD, 2017[13]) and consequently, increase public trust. However, as stressed by the European Commission's Joint Research Centre work, one "dilemma naturally emerges between securing citizens' privacy and maximising the efficiency of service delivery" (Misuraca and Van Noordt, 2020[7]).

Using digital tools to understand and meet users' needs at a more granular level has brought challenges for governments. If, for example, governments leverage AI and data without being transparent about the algorithms, data sources, process and purposes, and do not secure an ethical and unbiased use of data, citizens could easily have doubts and lose trust in the services being provided. Digital and data governance, therefore, play a key role in their use for the design and delivery of services – given the importance of data in the AI systems cycle, and the multiplication of data through IoT mechanisms, which can collect personal data on a regular basis (e.g. behavioural data of users).

Public services that leverage emerging technologies and data when embracing human-centred values can safeguard transparency, equity and accountability across the whole process, including for tasks performed by machines. Securing these principles is the only way towards trustworthy public services for the future.

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[38] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-23975.

[39] See: https://www.businessinsider.in/tech/news/government-plans-chat-bot-like-alexa-google-voice-to-deliver-public-services/articleshow/80072262.cms.

[40] Based on the information provided by the country through the data collection exercise. See Annex C.

[41] Based on the information provided by the country through the data collection exercise. See Annex C.

[42] Based on the information provided by the country through the data collection exercise. See Annex C.

In this line, the OECD Recommendation of the Council on AI (2019) and the Good Practice Principles for Data Ethics in the Public Sector can serve as guidance for countries to secure the trustworthiness of their AI systems and the underlying data that supports them (OECD, 2021[14]).

Possible approaches include the adoption and implementation of standards, principles and guidelines on ethics, transparency, privacy and security by which public sector organisations need to comply through specific actions. These actions include but are not restricted to data management practices and rules, the openness of algorithms and the auditing of algorithmic decisions and the data supporting their outputs, the publication of granular and disaggregated OGD, and the collaborative design and delivery service design processes that can help to mitigate risks and ensure inclusion (OECD, 2020[15]). Relevant examples in this regard from G20 members include the **Germany**'s Data Ethics Commission,[43] **Japan**'s Social Principles of Human-Centric AI,[44] the **Republic of Korea**'s National AI Ethical Guidelines,[45] **Canada**'s Algorithmic Impact Assessment Tool,[46] and the **United Kingdom**'s Data Ethics Framework.[47]

Furthermore, the more public sector organisations become digitalised, the more they become exposed to digital threats and the potential target of cyber attacks (Rivera Perez, 2020[16]). The COVID-19 crisis exposed the vulnerabilities of the healthcare sector, with it being the target of malicious actors during the crisis, including Distributed Denial of Service (DDoS) and ransomware attacks on hospitals, such as in France and Germany (OECD, 2020[17]).

Secured public services require governments to mitigate the various digital and cyber risks and threats that come about in the application of digital tools and data for public service design and delivery. This comes part of the G20 Digital Government Principle 3 *Security*. While G20 members such as **Brazil** (OECD, 2020[18]) and the **United Kingdom**[48] have invested in cyber security for many years, the exponential digitalisation of the public sector and society calls for G20 members to double efforts to shield public organisations and citizens from these threats.

[43] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24114.

[44] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24341.

[45] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-27065.

[46] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24387.

[47] See: https://www.gov.uk/government/publications/data-ethics-framework/data-ethics-framework-2020.

[48] See: https://www.gov.uk/government/publications/national-cyber-security-strategy-2016-to-2021.

2.3 Building and leveraging key enablers of digital government maturity to secure service continuity

Section 2.3 dives into how governments can build and leverage key enablers of digital government maturity to fully tap on the potential of digital tools and data, and secure the continuity of public service design and delivery – in line with the G20 Digital Government Principles 4, 5, 6 and 7 (i.e. *Digital Skills*, *Standards*, *Strategy*, *Evolution*) and the characteristics elucidated in Section 2.2.

The following five key enablers of digital government maturity will be analysed:

- Governance arrangements and mechanisms;
- Regulatory frameworks;
- Openness towards collaboration;
- User-driven culture of experimentation and inclusion;
- Competencies, skills and talent.

Securing digital and data governance for better co-ordination and coherence

Digital governance, including of digital tools and data, is the basis for better co-ordination, coherence and use of common building blocks for continued service design and delivery. It serves as the basis for governments to fulfil all the G20 Digital Government Principles.

A solid digital governance is built on a vision, strategy and action plan with the commitment to fulfil them. This encompasses the use of policy levers to secure coherent implementation across policy areas and levels of government, and to enforce common rules and standards. It sets the basis for digital maturity in a coherent fashion, and the use of digital tools and data as a means to secure trust in governments.

As contexts change rapidly, and citizens and businesses desire better outcomes, governments can no longer plan and implement public policies and services in a top-down and siloed manner. This calls for a transformative, integrated and co-ordinated approach to the use of digital tools and data involving the whole digital government ecosystem. In this regard, governments play a major role in leading this systemic evolution towards being digitally mature, competent and principled in meeting people's needs.

High-level and cross-cutting governance can be reflected in the development of national strategies on AI, data and IoT. Examples of G20 members that have put in place or are developing and revising dedicated national AI strategies include **France**,[49] **Germany**,[50] **India**,[51] **Indonesia**,[52] **Italy**,[53] **Japan**,[54] **Russia**,[55] and

[49] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-25374.

[50] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24114.

[51] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24951 .

[52] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26968.

[53] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24764 .

[54] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-25312.

[55] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24901 .

Turkey[56]. The **EU** adopted the Co-ordinated Plan on AI in 2018 to encourage the development of national AI strategies and synergies and co-operation across Member States, and is undertaking steps to review it (Van Roy et al., 2021[19]). Examples of G20 members that have national data strategies include the **United Kingdom**[57] and the **United States**[58] while **Brazil** has a national IoT plan.[59]

Furthermore, governments should align the governance of digital government, data and AI. **Saudi Arabia**'s National Strategy for Data and AI[60] and the establishment of the Saudi Data and AI Authority (SDAIA) to drive this national agenda[61] is an example of how G20 members are bridging further the gap among these policy areas. G20 guest country **Singapore**'s Digital Government Blueprint presents an all-encompassing strategy to increase the use of digital and new technologies including AI and data in public services.[62]

Having complementary and integrated digital, data and AI governance requires adopting a process thinking and methodology that can help to combine resources, co-develop outputs and build the basis to exchange data with interoperability for public service design and delivery. There are often synergies that can allow co-ordination and coherence among the different uses of digital technologies and data for public services that meet the needs of the user.

The OECD framework for data governance in the public sector (OECD, 2019[20]) (see Figure 2.1) provides an example of a comprehensive data governance approach, with clear linkages with the OECD Framework on the Governance of Digital Government (OECD, forthcoming[21]): the core elements (e.g. leadership, vision, coherence, regulation) of the two frameworks are well aligned. These elements are transversal in terms of necessitating the leadership (political and administrative), co-ordination and coherence that is extremely crucial in supporting good public service design and delivery, be it agreeing on how digital tools and data should be used or how the spending and experimentation activities should be carried out.

[56] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26590.

[57] See: https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy.

[58] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24303.

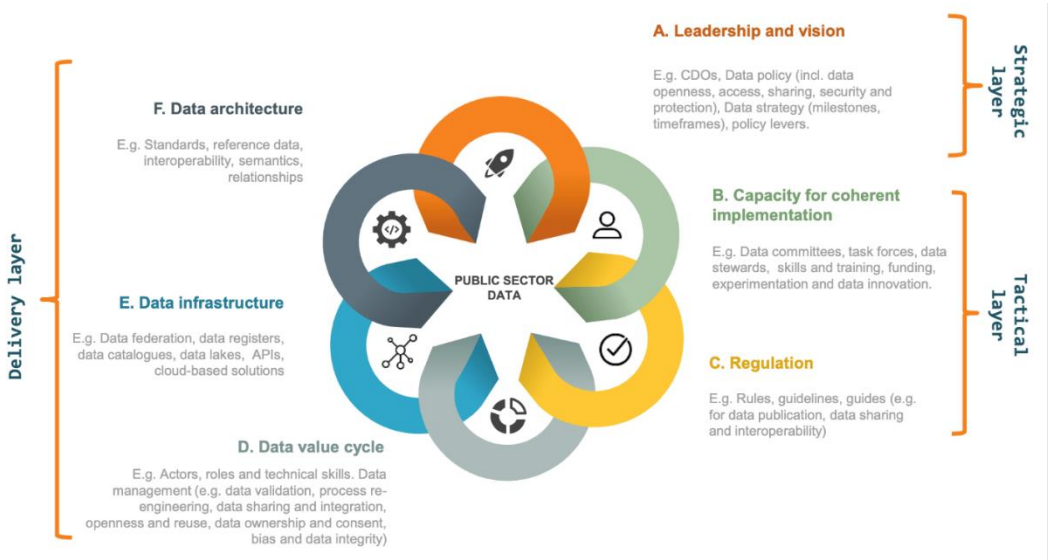
[59] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26714.

[60] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26934.

[61] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26016.

[62] See: https://www.tech.gov.sg/digital-government-blueprint/.

Figure 2.1. The OECD framework for data governance in the public sector



Source: (OECD, 2019[20]), *The Path to Becoming a Data-Driven Public Sector,* https://doi.org/10.1787/059814a7-en.

Establishing standards, principles and guidelines on the use of digital technologies, data and AI can lay the ground for an integrated and coherent digital adoption and transformation across the public sector. In **Italy**, the Revenue Agency is implementing a data-driven approach to improve risk analysis for tax evasion and decision-making for tax policy, framed within guidelines issued by the Ministry of Economy and Finance to secure coherence in the use of data and algorithms for policy making.[63]

In line with the provision on the G20 Digital Government Principle 5 *Standards*, another highly relevant area for synergising digital and data governance is in the development and use of shared tools and resources for enabling a Government as a Platform ecosystem. Creating a Government as a Platform is about setting up an ecosystem to catalyse digital transformation by helping public sector organisations and their service teams design and deliver user-driven quality services with ease and trust. This approach requires governments to conceive the governance of digitalisation and data in an integrated and systemic way: providing best practice guidelines, service standards, open source tools, common technical or style guides (e.g. APIs, interoperability, language), and manuals for public services that highly rely on digital tools and data. Governments should also be able to make these tools and resources available outside the public sector to foster collaboration with the private sector and civil society (OECD, 2020[8]).

Government as a Platform signals digital government maturity, and as a result, makes it possible to tap on common tools and resources for the co-delivery and co-design of services in a more efficient and coherent fashion, including amidst emergencies, therefore optimising resources in the public sector at the national and international level.

In a bid to build a Government as Platform, the **United Kingdom** has developed different open-sourced platform solutions, such as notification, payments and cloud hosting services, for public services to build on.[64] **Canada**'s Notify that was built using open source code from the GOV.UK Notify service[65] highlights the potential of open source for cross-border digital collaboration. In the **EU**, "an international group of

[63] See: https://www.agenziaentrate.gov.it/portale/web/guest/cs-4-marzo-2021-audizione.

[64] Based on the information provided by the country through the data collection exercise. See Annex C.

[65] Based on the information provided by the country through the data collection exercise. See Annex C

scientists, academics, technology experts and companies has been working on the Pan-European Privacy-Preserving Proximity Tracing (PEPP-PT) project, a standardised smartphone data processing tool that can result in co-ordinated contact tracing across Europe and beyond" (United Nations, 2020[9]). The European Commission's strategy 2030 Digital Compass: the European way for the Digital Decade provides a good example of paving the way for such an approach.

Digital identification as a common tool is also crucial for building, scaling and managing digital public services in a reliable and trustworthy way. **Saudi Arabia** uses a National Single Sign-On service for its GOV.SA portal for citizens to directly access public services.[66] Similarly, **Russia** is developing the Integrated Identification and Authentication System (IIAS) as a unified identification and authentication system for state and municipal systems, which can be used with third parties including financial institutions with users' consent.[67] More evidence on the development, uptake and use of digital identification can be found in the *G20 Collection of Digital Identity practices* prepared under the 2021 G20 Italian Presidency.

At the same time, and in line with the provision of the G20 Digital Government Principle 6 *Strategy*, an effective and efficient digital governance ensures the allocation of resources to promote AI development in the public sector. It uses funding as a policy lever to secure the alignment with and use of shared digital standards and tools. The use of common instruments such as business cases, monitoring and reporting mechanisms to keep track of the impact of digital government projects can help to mainstream good digitalisation practices in the public sector. Formalising spend controls is another effective way for governments to help public sector organisations manage and optimise expenditure for digital government projects in the pipeline openly, thereby boosting cross-government collaboration and cohesion. Examples among G20 members include those of **France**'s Public Action Transformation Fund (Misuraca and Van Noordt, 2020[7]) and the **United Kingdom**'s digital and technology spend controls[68] (OECD, 2019[22]).

Leveraging regulatory frameworks to maximise the value of digital goods

Regulatory frameworks lay a vital foundation for driving and enabling digitalisation within the public sector and the design and delivery of public services.

Establishing a sound regulatory environment that enables digitalisation within the public sector while preserving privacy and security is critical to accommodate the need for governments to balance the risks and opportunities associated with the use of digital technologies. The importance of being able to count on up to date and forward-looking regulatory frameworks that support interoperability and agile policy response across governments was more than ever highlighted by the COVID-19 pandemic.

Laying out the regulatory frameworks that engrain key principles (e.g. data-driven, open by default, user-driven, inclusion, ethics) in public service design and delivery based on the use of common enablers (e.g. data registers, digital identity, interoperability) is essential to provide responsive solutions in the most efficient way. In the context of digital government, some of the key domains of regulation fall under three broad categories (OECD, 2019[20]) (OECD, forthcoming[21]):

[66] See: https://www.my.gov.sa/wps/portal/snp/content/NationalProfile.

[67] Based on the information provided by the country through the data collection exercise. See Annex C.

[68] See: https://www.gov.uk/guidance/digital-and-technology-spend-controls-version-5.

- Digital rights of citizens and businesses (e.g. access to public sector information, base registries, public services; communicating digitally, participating and engaging with the public sector; privacy and personal data protection; cyber security; use of digital signatures and digital identification);
- Digital enablers and artefacts (e.g. digital documents, digital signatures, digital identification, omni-channel, interoperability, ICT/digital procurement);
- Digital principles (i.e. digital by design, data-driven, government as a platform, open by default, user-driven, proactiveness, once-only).

As governments accelerated their digital transformation over the COVID-19 crisis, data protection, privacy and cyber security further stood out as priorities governments had to address. Having the necessary legal and regulatory foundations underlying these domains, in addition to adopting risk management approaches and soft law, was a critical enabler for rolling out digital public services while safeguarding public trust at the outbreak of the pandemic. For example, the **United Kingdom**'s GOV.UK Platform as a Service (PaaS) product allows public institutions to host services in the cloud, in line with National Cyber Security Centre Cloud Security Principles to safeguard minimum security standards – thereby, increasing the readiness of service delivery. Since the start of the COVID-19 pandemic, there was an increase in 66% of new accounts on the PaaS compared with the previous year.[69]

Given the speed of digital transformation, governments also need to be open and flexible in their legislative and policy making processes to attain the agility and dynamism for keeping the regulatory frameworks up to date and flexible to accommodate the emergence of new technologies. The 2019 G20 Ministerial Statement on Trade and Digital Economy detailed the recognition by G20 members that "governance in the digital era needs to be not only innovation-friendly but also innovative itself, while not losing legal certainty" (METI, 2019[3]).

Governments can set the legal basis for stakeholder consultation in regulatory processes; collaborate with external stakeholders that research, monitor developments and dispense advice in this domain; create regulatory sandboxes for experimentation under fixed-term exemptions and observation; and adopt a "wait-and-see" approach with continuous assessments and reviews. For example, **Germany** has set regulatory sandboxes, using experimentation clauses, to promote testing digital innovations under real conditions and developing a smart regulatory framework.[70] The **Republic of Korea** has leveraged regulatory waivers for firms to test new technologies and services in real market conditions and allow the government to improve related regulations based on real-life data.[71] These different options play an important role in enabling a digital governance environment that can facilitate the deployment of digital tools for public service design and delivery.[72] The *Survey on agile regulation across G20 members* prepared under the 2021 G20 Italian Presidency provides further detail on these regulatory approaches.

[69] See: https://www.cloud.service.gov.uk/cloud-security-principles/; https://admin.cloud.service.gov.uk/performance.

[70] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-25893.

[71] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-24294.

[72] For more information on regulatory policy, management and governance, see the OECD Recommendation of the Council on Regulatory Policy and Governance (2012): https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0390.

Enabling openness towards collaboration within national ecosystems and across borders

An open environment promotes more innovation, co-ordination and coherence within the public sector and with external stakeholders, thus resulting in a more informed, higher quality, efficient and effective design and delivery of public services.

Adopting open government principles[73] is crucial in the elaboration of digital tools to improve public service design and delivery. Openness in designing and delivering services can protect the public interest, and encourage the flourishing of user-driven, inclusiveness and proactive public services. The greater the openness, the better governments are able to anticipate problems and respond to users' needs proactively.

To promote openness concretely, governments can take a number of actions. At a higher level, in laying out the foundational governance arrangements and mechanisms such as strategies, investment plans, legal and regulatory frameworks, it is essential to show how the openness agenda fits within, or is coherent with, broader policy agendas (e.g. digitalisation, innovation, anti-corruption, development) so that its value is clear in relation to the broader policy context and reforms.

However, in practice, transforming how teams work within the public sector is paramount for enabling open collaboration across organisational and sector boundaries that can secure a co-ordinated and coherent design and delivery of services. The traditional approach usually entails siloed and separate steps managed by different teams and stakeholders in charge of: (i) developing the concept; (ii) procuring the necessary digital technologies; (iii) operating the service; (iv) monitoring and assessing the impact. This disconnection can be problematic as the requirements to design and deliver services with agility and speed ramp up, especially during a crisis. Instead, an open and collaborative approach involves bringing together the policy, design, research, delivery and operation teams and enabling a smooth exchange of information and data among them (OECD, 2020[8]). Working in such an open, agile and integrated manner requires standards, principles and guidelines to help public officials reach a common understanding of the new practices to be adopted in order to attain the objectives collectively, efficiently and effectively.

In line with the provisions on the G20 Digital Government Principles 4, 6 and 7 *Skills*, *Strategy* and *Evolution*, developing strategic partnerships with the entire digital government ecosystem is essential to provide better services. These partnerships should ideally be engaged throughout the whole lifecycle of policy making and service design and delivery – from user research and scoping of the problem, to testing whether the services meet the needs and iterating.

One burgeoning area is the opening up of ICT/digital procurement processes to simplify the delivery of public services and strengthen partnerships with the private sector. The "Roadmap for Digitalisation: Policies for a Digital Future" adopted by G20 Digital Ministers in 2017 calls for the support of micro, small and medium enterprises (MSMEs) in reaping the benefits of digitalisation. One way to do so is to "promote a more entrepreneurial-friendly environment by encouraging programmes […] to foster existing and innovative new business models and tap into existing and new sources of financing" (BMWi, 2017[1]).

In the context of building a strong GovTech community, the government plays a primary role in reducing bureaucracy, increasing access by MSMEs, and enabling procurement to respond to users' needs directly.

[73] The OECD open government principles are transparency, integrity, accountability and stakeholder participation. See: https://www.oecd.org/gov/open-government/.

In an effort to capture good procurement practices, the **United Kingdom**, in collaboration with the OECD, developed the ICT Commissioning Playbook in collaboration with the E-Leaders[74] Thematic Group on ICT Commissioning in 2018. It sets down good practices such as considering user needs, and enabling open standards, open source software and open data throughout the contracting lifecycle for collaboration (GDS, n.d.[23]). In the same vein, the **United Kingdom**'s outcomes-based procurement model in the Digital Marketplace[75] and the AI Procurement in a Box Tool[76] further demonstrates how G20 members can guide and promote responsible technology procurement practices.

Openness can also be a huge boon for international co-operation and collaboration. For instance, the trilateral **French-Japanese-German** research projects on AI[77] show how G20 members can partner to address common issues and achieve common objectives. The Global Partnership on AI (GPAI) is a multi-stakeholder and intergovernmental alliance developed in 2020 that also demonstrates how countries can deliver on the G20 AI Principles.[78] Countries can also leverage communities of practice beyond their borders to spur value creation, as done by **Turkey** in the context of the 2019 TEKNOFEST, which established a focus group on AI organised with the Assembly of Turkish Scientist Abroad.[79]

Establishing a user-driven culture of experimentation and inclusion

> In order to develop public services that respond and adapt to the changing needs and demands of citizens, the public sector can benefit from promoting a culture of meeting users' needs across public sector through experimentation and inclusion.

As discussed earlier in Section 2.2, digital tools and data provide an opportunity for the public sector to engage with users and efficiently channel needs into service formulation and redesign processes through collaborative mechanism and user research. However, for these user-driven approaches to work effectively, it is essential to be proactive in promoting user engagement as early and as often as possible in the (re)design process.

To achieve effective transformation, it is critical for policy makers to understand interactions between citizens and the public sector as a whole and not as isolated events. Designing quality and reliable public services requires identifying and understanding the whole delivery process, analysing the interactions, data flows and sequences necessary for their delivery (OECD, 2020[8]). Moving towards higher levels of digital maturity demands governments and their officials to understand these insights and act accordingly.

Creating a culture of meeting user needs requires governments to put in place tools like digital service standards that promote the engagement of users in the service design and delivery process. For example, the **United Kingdom**'s GOV.UK Design System allows teams in the government to build services using

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[74] The E-Leaders are the OECD Working Party of Senior Digital Government Officials. See: https://www.oecd.org/governance/eleaders/.

[75] See: https://www.digitalmarketplace.service.gov.uk/.

[76] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-27022.

[77] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26503.

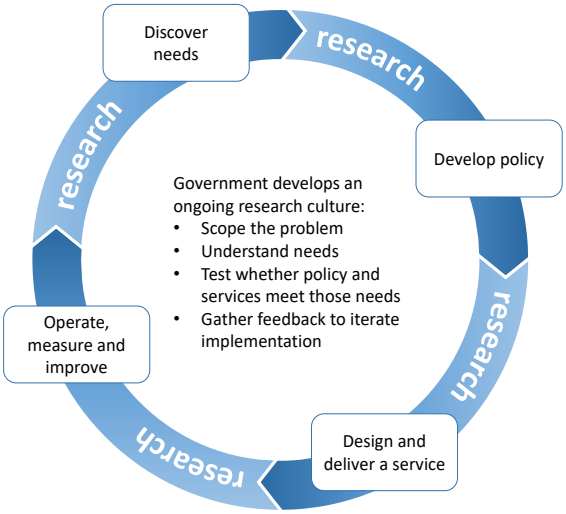
[78] See: https://www.gpai.ai/.

[79] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26190.

components that comply with the service standard.[80] These common practices would need to be coherent across the public sector in order to successfully transform the working culture. In addition, a user-driven culture will greatly benefit from an open and collaborative environment in which multi-disciplinary service teams can freely exchange and learn across organisational boundaries.

Finally, adopting an agile delivery methodology allows governments to better keep up with the uncertainty inherent in the creation process, foster continuous learning and prioritise the creation of value for the end user. Through experimentation and iteration, governments can meet user needs on an ongoing basis, generating a cyclical exercise focused on value creation for users (see Figure 2.2). An agile delivery methodology implies a continuous user involvement in the service and policy design process, shifting from a top-down to a bottom-up approach in the formulation of public services. As a result, instead of being initiated in government, services are created in response to an actual and realistic understanding of citizen needs based on research conducted with them, reflecting views expressed across a wide sample of the population and informed by insights available from societal data (OECD, 2020[8]).

Figure 2.2. Agile delivery methodology



Source: (OECD, 2020[8]), *Digital Government in Chile – Improving Public Service Design and Delivery*, https://doi.org/10.1787/b94582e8-en.

Cultivating competencies, talent and skills in the public sector and beyond

> Digital competence is a key enabler for digital government maturity and sustained public service design and delivery. A digitally-skilled public force is able to drive lasting change, therefore supporting the transformation of a digitally-enabled public sector and state.

The 2017 G20 Digital Economy Ministerial Declaration "Shaping Digitalisation for an Interconnected World" has a specific annex that covers "Digital skills in vocational education and training". This shows the strong awareness and consensus among G20 Leaders that the "[...] promotion of digital literacy, high quality education and acquisition of digital skills will help diminish digital divides between and within countries, […]

[80] Based on the information provided by the country through the data collection exercise. See Annex C.

foster occupational participation […] and promote inclusive growth". Additionally, it can also "contribute to digital capacity building within governments [towards] a capable workforce".

The Declaration called for the commitment to "monitor the need for digital skills in the workplace, in administration and in government and adjust education and training programmes according to the developments in the changing world of work" amongst other actions (BMWi, 2017[1]). The provision on the G20 Digital Government Principle 4 *Digital Skills* reaffirmed the consensus among G20 members in relation to the relevance of this topic for digital government maturity.

The OECD Framework for Digital Talent and Skills in the Public Sector presents a three-pillar framework to help governments manage and grow their digital competencies (OECD, 2021[24]): (i) an environment to encourage digital talent; (ii) skills to support digital government maturity; and (iii) practical steps and enabling activities to establish and maintain a digital workforce.

An environment that encourages the development of digital competencies requires leadership with strong awareness of the required digital skills. It also communicates a clear and comprehensible vision of the role of digital tools for better public services, engages actively with the public workforce and invests in skills development with a vision for the long term. **Turkey**'s Centre of Excellence of Data Analytics provides a hub to support policy makers in analysing and processing data in a secured environment and receive training in data science.[81] **China**'s AI Innovation Action Plan for Institutions of Higher Education illustrates how building digital national talent requires a vision that spans different generations.[82] The **United Kingdom** established digital, data and technology skills as a core function in the government, supported by a capability and pay framework to recruit and retain digital talent.[83]

To elucidate the different kinds of skills needed to advance, operate and participate in a digital government, the skills to support digital government can be grouped into five categories (OECD, 2021[24]):

- **Digital government leadership skills**: Leadership that can visibly model digital government user skills and actively shapes an environment that promotes digital transformation, as covered earlier.
- **Digital government professional skills**: Relevant for user-centred design professionals, service professionals, product professionals, delivery professionals, data professionals and technology professionals with their respective skill profiles and career progression.
- **Digital government socio-economic skills**: Ability to strike a balance among vision, analysis, diplomacy, agility and protection and exhibit behaviours of trustworthiness, proactiveness and user-centricity for public officials working in service design and delivery.
- **Digital government user skills**: Recognising the potential of digital, understanding users and their needs, collaborating openly for iterative delivery, trustworthy use of digital tools and data.
- **21st century skills in society**: Digital, cognitive and socio-emotional skills and their associated behaviours to thrive in the digital age, and as the baseline for every citizen and public official.

Finally, the practical steps and enabling activities to maintain a digital workforce in the public sector need to be constructive in providing opportunities for growth and development through agile and flexible talent attraction, recruitment, (re)training, and retention programmes. It is essential for governments to embed the skill requirements, clarify professional and personal development and career progression, and provide an attractive reward system – in line with overarching policy strategies and action plans (OECD, 2021[24]).

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[81] See: www.kolayihracat.gov.tr.

[82] See: https://www.oecd.ai/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-26851.

[83] See: https://www.gov.uk/government/collections/digital-data-and-technology-profession-capability-framework.

2.4 Observed trends in the use of digital tools and data for public service continuity in response to the COVID-19 pandemic among G20 members

Section 2.4 briefly presents the main trends observed in the use of digital tools and data for public service continuity in response to the COVID-19 pandemic, reflecting on the ideas and elements discussed in Section 2.2 and 2.3. These observed trends are based on specific practices provided by G20 members and are summarised in Annex A. For detailed information on the practices provided by G20 members, please refer to Annex C.

Analysing the different practices collected across G20 members, it is possible to separate the collected practices into two categories:

- Digital tools boosting public sector capacities and capabilities
- Digital tools transforming public service access, design and delivery

Digital tools boosting public sector capacities and capabilities

The following practices have focused on building and strengthening public sector capacities and capabilities by leveraging emerging technologies such as AI/ML, IoT, together with the strategic use of data. Developing and strengthening public sector performance has a direct effect on the quality and timeliness of public services, enabling their continuity in times of disruption.

IoT and data-driven approaches for vaccine management

Practices such as the Electronic Vaccine Intelligence Network (eVIN) developed by **India** have enabled better control of vaccine management and storage by leveraging IoT and the strategic use of data. The eVIN enabled the roll out of COVID-19 vaccination and ensured the continuity of national vaccination programmes. Similarly, the **United Kingdom** developed an IoT-based cold chain monitoring system of COVID-19 vaccine for the National Health Service facilities to ensure the quality of delivered vaccines by keeping data-driven oversight of distribution and storage. With these practices, the existence of sound data governance mechanisms are crucial to ensure the efficient and trustworthy management of the data generated by IoT tools.

Upskilling the public sector

In the same line, G20 governments were able to cultivate or tap on existing digital talent and skills to strengthen responsiveness and adoption of innovative digital tools amidst the COVID-19 crisis. Practices such as **Canada**'s Government of Canada (GC) Talent Reserve allowed the government to co-ordinate and allocate digital talent across public sector organisations in an emergency response context, enabling the continuity of public services.

Common digital tools for rapid response

The Government as a Platform approach has enabled the rapid deployment of critical tools for the continuous delivery of services in times of disruption. Tools such as **Canada**'s Notify or the **United Kingdom**'s GOV.UK Notify and GOV.UK Pay facilitated the rapid adoption of user notification mechanisms and means of payments respectively.

In the case of Canada, Notify allowed the government to set up the email notification service quickly and have the capacity to send more than one million messages a month to provide timely information on the COVID-19 situation. The United Kingdom's GOV.UK Notify allowed the government to scale up daily critical messages by 600% across all channels (i.e. SMS, email, letters) to people in need. The usage

increased from a daily average of 150 000 before the COVID-19 pandemic to 2 million SMS messages in March 2020. GOV.UK Pay platform also enabled agencies and local governments to transform payment channels within a day. Local governments were able to secure donations for crisis funds and food banks for their communities through this instrument. In both cases, governments could rely on standing digital maturity that provides a common ground for co-ordination, the right incentives and accountable mechanisms for deploying these scalable tools.

Turkey's Public Financial Management Information System Project allowed public sector organisations to transact digitally, which enabled an efficient adoption of digital payments for public service users especially during the COVID-19 pandemic. **Argentina**'s Trámites a Distancia platform enabled the government to move formal processes from the physical to the virtual world so that citizens and businesses could carry out their interactions with public agencies digitally. In **Turkey**, the Safir Depo cloud service enabled teleworking in the public sector amidst the restriction measures imposed by the COVID-19 pandemic. By providing a secure and self-hosted solution to store internal documents and access to these documents from any location, the Safir Depo project reduced obstacles for the transition to remote working.

The value of shared digital identity tools for coping with the pandemic has been also critical to allow coherent and streamlined policy responses. In **Australia**, the use of the shared digital identity tool and myGov platform has allowed citizens to access public services during the COVID-19 pandemic. In **Brazil**, the use of digital identification increased exponentially during the COVID-19 pandemic with more than 106 million Brazilians using their digital identity to access 3 000 public services online.

Open source for scalability

During the COVID-19 pandemic, open digital tools and data published and shared by all kinds of stakeholders played a central role in encouraging open platforms, open standards, open source software and open data for cross-border collaboration and alignment in the use of digital tools for building a human-centred future. Scalability is fundamental to make sure that digital and data solutions are re-used across the public sector to address common problems. In this light, open source can help to develop tools that could be transposed from one application to another as easily as possible (Rivera Perez, 2020[16]).

In line with the above, and in response to the COVID-19 pandemic, **Canada**'s Digital Service and the School of Public Service Digital Academy launched the Open Call Initiative, which is an online and live repository of freely accessible and re-usable open source tools that Canadian jurisdictions can tap on to respond to the COVID-19 pandemic. In **France**, the chatbot open source tool was deployed in conjunction with local providers, reinforcing the principle of openness and collaboration with the digital government ecosystem to exploit the co-creation of public value. In order to foster a globally interoperable standard for vaccination certificates, G20 guest country **Singapore** created an open source standard of its notarisation and verification system HealthCerts and partnered with private sector players.

AI-driven COVID-19 risk scanning and analysis

The use of AI has also enabled governments to improve their capabilities in healthcare management, improving the speed of analysis and evaluation of computed tomography (CT) scans. **Turkey** uses AI-powered technologies to analyse CT scans of lungs to diagnose COVID-19 and allow physicians to instead prioritise caring for the patient. These tools help healthcare workers prioritise potential cases, ensuring isolation and improving the responsive capacity of health facilities.

The potential of AI tools in optimising mechanical tasks, such as pattern identification in the case of CT scans, allows public processes to be optimised to improve public sector capacities and capabilities. AI presents an opportunity for governments to improve their internal processes and spur efficiency gains in public institutions. The adoption of these technologies must be embedded in sound digital governance and the right regulatory frameworks safeguarding human-centric approaches.

Digital tools transforming public service access, design and delivery

From the evidence collected, G20 members have deployed the use of emerging technologies to transform service delivery, ensuring continuity in times of disruption. Governments have relied on emerging technologies not only to keep public services operational in critical times, but to also support the deployment of the required measures to cope with the effects of the pandemic.

Digital tools for emergency response

The creation of web-based or mobile platforms or apps has been at the core of the policy responses put in place by G20 members across different stages of the pandemic. In March 2020, the **United Kingdom** developed and launched, within five days, the GOV.UK coronavirus landing page based on the GOV.UK Design System. This page provides information, guidance and support on areas like health and well-being, housing and accommodation in the context of the COVID-19 pandemic in a single page. During the first month of operation, the landing page had more than 26 million visits.

South Africa created a COVID Alert SA app to enable contact tracing of COVID-19 based on Bluetooth exchange. **Indonesia**'s PeduliLindungi app similarly relies on location data for contact tracing of COVID-19. **Argentina**'s Cuidar app and **Canada**'s former COVID-19 app and Self-Assessment Tool (retired on June 30, 2021) aim at guaranteeing access to essential information and self-diagnosis of COVID-19 symptoms. **Italy**'s Digital Arianna contact tracing app used incentives such as certificates and vouchers to promote good behaviour among Italian citizens and better control and track the pandemic. G20 guest country **Singapore** created the TraceTogether and SafeEntry apps that have helped to reduce the time taken to identify and quarantine contacts that have been in close proximity.

Various G20 members, such as **Argentina**, **France**, **Germany**, **India** and **Mexico** also deployed AI-powered chatbots to improve reliable communication with their citizens regarding the virus including prevention and response measures to the health emergency. **Argentina**, **India** and **Mexico** collaborated with large social media platforms such as WhatsApp and Facebook to extend the reach and impact of their chatbots. Similarly, G20 guest country **Singapore** created a gov.sg WhatsApp channel to push out daily updates on the COVID-19 situation to subscribers.

As the pandemic evolved (i.e. with vaccination roll-outs and ease of mobility restrictions), the focus and purpose of these tools have also adapted and evolved. In **Argentina**, the government added a new function to the MiArgentina app so that citizens could carry the digital certificate of the COVID-19 vaccination and provide it when needed, thereby reducing the need for paper-based certificates. **Canada**'s ArriveCAN tools and the Mental Health and Substance Abuse Support Portal have been critical in managing the pandemic and its negative impact on well-being, by providing contact, quarantine and travel information and mental health support. At the **EU** level, the Digital COVID Certificate allows citizens of EU Member States and other non-member countries[84] to issue and hold a digital and mutually recognised certificate of COVID-19 vaccination, testing and recovery. G20 guest country **Singapore** deployed new initiatives such as the National Appointment System for COVID-19 Vaccination to co-ordinate vaccine appointments and rollout.

Digital platforms for service delivery and continuity

Germany relied on digital platforms to secure the continuity of welfare assistance. Efforts included the Elterngeld Digital initiative that allowed the sustained provision of parental allowance benefits after restriction measures were imposed, and the Familienportal, an online platform for social services that saw a 275% increase in activity after the COVID-19 outbreak. **Canada**'s Employment and Social Development designed and launched a new digital service in just 10 days so that Canadian citizens could apply for a

[84] Iceland, Liechtenstein, Norway, San Marino, Switzerland, Vatican City.

new Social Insurance Number (SIN) online in response to the closure of physical premises. In **China**, the government of Shenzhen leveraged the iShenzhen app to continue providing over 8 000 contactless public services to over 50 million registered users in the areas of healthcare, education, housing, transportation and business.

Improvements and iterations were also made to existing digital platforms over the COVID-19 pandemic. In **Russia**, during the outbreak in 2020, more than more than 40 additional services were included in the UPSP (see Section 2.2) and a Digital Profile function was integrated into financial institutions for citizens to access credit and financial services online. Over the same period, **Australia**'s agency that delivers social security and welfare payments, Services Australia, built and launched an online "intent to claim" process for JobSeeker Payment in the myGov portal within 36 hours such that users did not need to call or visit a service centre. Within months from March 2020, there were 3.4 million users of this new process.

In the area of healthcare, the government of Jiangsu Province in **China** developed the Jiangsu Health App to provide a one-stop shop for a whole range of healthcare services and for users to store their medical data in which only they have access to. Over the pandemic, healthcare professionals could offer virtual diagnosis, treatment, fever outpatient services through the Jiangsu Health App, ensuring timely and quality medical services. By the end of 2020, the services on the App were accessed over 74 million times.

Digital platforms were also deployed to support the continuity and customisation of educational services as countries were forced to impose restriction measures. **Argentina**'s Ministry of Education developed the Juana Manso Platform to support remote education, providing educational materials, activities and virtual classrooms during restriction measures in 2020. **Turkey** built a digital platform to support educational service delivery in the midst of the outbreak. The Educational Information Network (EBA) platform allows interactions between teachers and students, and provides a customised interface according to certain characteristics of the students.

Tourism, one of the most hit areas by the COVID-19 pandemic worldwide, was also the target of governments' digitalisation efforts. For instance, in March 2020, the Ministry of Culture and Tourism of **Turkey** launched a website providing open access to 32 national museums and archaeological sites, securing the continuity of cultural services during the restriction measures imposed during the COVID-19 outbreak reaching more than 14 million visits.

Improving access and connectivity to support digital inclusion

South Africa temporarily released high-demand radio frequency spectrum to licensees to ease network congestion and ensure the continuity of crucial public services in the healthcare and education sector during the COVID-19 pandemic. **South Africa** also adopted an omni-channel approach by complementing the development of online platforms for the continuity of educational services with the live broadcasting of classes through TV and radio channels, and leveraged rural radio networks to expand coverage to remote locations. In addition, the government offered zero-rated applications and educational websites together with private network providers.

Data access and sharing

In **Brazil**, databases containing information of lower-income citizens were used to better target the population in need and make Emergency Aid transfers more efficient, which benefited roughly 118 million citizens (55.8% of Brazilians citizens). **Argentina**'s digitisation of the ISA (see Section 2.2) was possible due to the cross-matching and validation of biometric data from the National Registry of Persons (RENAPER) with data from the Unique Certificate of Disability (CUD) of the National Agency for Disability (ANDIS).

Italy's Civil Protection Department released an open data dashboard including metadata and georeferenced data to inform citizens on the evolution of the COVID-19 pandemic and containment measures. In **Canada**, the COVID-19 Interactive Case Map and Data Summary allowed users to obtain up-to-date and detailed data, including breakdowns by age and sex, on the spread of the virus nationwide and in different regions of the country. These efforts align with those of other G20 members which make the publication of OGD on the development of the pandemic a priority, including in the context of emergency expenditure and vaccination rates.

Public-private partnerships for emergency response

In **Italy**, the Ministry of Digital Innovation and Transition launched "Digital Solidarity", an initiative which aimed at tapping on resources from different sectors and highlight the shared responsibility of actors beyond the public sector to help citizens, professionals, and companies to better adapt and react to the pandemic.

The **Republic of Korea** leveraged collaborations with the private sector to distribute emergency relief funds to more than 20 million households. Faced with the logistical challenge of rapidly expanding coverage of the welfare system, the government collaborated with 18 of the 19 payment card providers to link infrastructure between public services and private payment systems to provide welfare aid to each eligible citizen. Without exchanging data, the Korean government and the private sector were able to link the digital infrastructure to secure transfers to 99.1% of the population (68% of them through private providers) within three weeks without failures. This collaborative approach allowed the government to save money, using existing infrastructure, and improve service delivery in a timely manner. This turned out to be the first case of private-public partnership in the Republic of Korea, where the government used private infrastructure and service platforms to deliver government services.

Digitalisation for business support and economic recovery

China leveraged digital technologies to support the recovery of small and medium enterprises (SMEs) after the economic shock caused by the COVID-19 outbreak. China's Action Plan on Digital Transformation of SMEs builds on digital services providers to improve digital capacities within SMEs, thereby boosting productivity for economic recovery.

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Annex A. Selected practices across G20 members on the use of digital tools for public service continuity in response to the COVID-19 pandemic

Annex A presents selected practices G20 members leveraged and/or put in place in response to the COVID-19 pandemic in order to secure the continuity of services. These practices draw upon i) a selection of those practices collected from G20 members (Annex C); ii) OECD policy work and other data at the international and EU level, and iii) secondary research performed for the purpose of this Compendium.

G20 member (or guest country)	Initiative	Service	Digital Tool	Data	Source
Argentina	Chatbot COVID	Official information on the COVID-19 pandemic via Facebook and WhatsApp chatbots	AI	Data supplied by users	Based on the information provided by the country through the data collection exercise
Argentina	Chatbot Line 144	Assistance for people facing gender violence situations during the COVID-19 pandemic via WhatsApp	AI	Data supplied by users	Based on the information provided by the country through the data collection exercise
Argentina	Distance Administrative Procedures Platform (Trámites a distancia)	Online platform for national administrative procedures	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
Argentina	Cuidar app	Self-diagnosis for early detection of COVID-19 cases and follow-up	Digital platform	Data is supplied by the users under a sworn statement. Personal data is protected by Law 25326.	Based on the information provided by the country through the data collection exercise
Argentina	Vaccine digital credential and MiArgentina	Digitalisation of COVID-19 vaccination certificates	Digital platform, digital certificate	Each jurisdiction is responsible for the upload of information regarding vaccinated people.	Based on the information provided by the country through the data collection exercise
Argentina	Juana Manso Platform	Remote education and learning	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise

Argentina	International Digital Symbol of Access and MiArgentina	Digitalisation of the International Symbol of Access	Digital platform	Biometric data, personal data	Based on the information provided by the country through the data collection exercise
Australia	Digital Identity and myGov	Simple, secure digital access to public services including COVID-19 vaccination certificates	Digital identity, digital platform, digital certificate	Identity data, customer data and service delivery data	Based on the information provided by the country through the data collection exercise
Australia	Digital improvements to myGov: JobSeeker Payment	Social services, specifically social security and welfare payments	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
Brazil	Digitalisation of prioritised public services	Online channels for 40 public services with offline channels	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
Brazil	Expansion of digital Identity	Digital identity to access public services	Digital identity, facial recognition, digital certificate	Biometrics and administrative data	Based on the information provided by the country through the data collection exercise
Brazil	Emergency Aid Programme	Implementation of the Emergency Aid Programme including creation of digital bank accounts	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
Canada	Gender, Diversity and Inclusion Statistics	Disaggregated data for diverse population groups in the context of COVID-19	Digital platform	Open data	Source
Canada	Treasury Board of Canada Secretariat GC Talent Reserve	Talent and skills management including digital talent and skills across the government	Digital cloud, AI, big data	Human resources and administrative data	Based on the information provided by the country through the data collection exercise
Canada	Notify	Notify for the COVID-19 email notification service	Digital cloud	Administrative data	Based on the information provided by the country through the data collection exercise
Canada	Canadian Digital Service and Canada School of Public Service Digital Academy Open Call Initiative	Living catalogue of re-usable tools to address COVID-19 challenges for the Canadian public service	Digital cloud	Open data	Based on the information provided by the country through the data collection exercise
Canada	Health Canada COVID-19 App and Self-Assessment Tool	Self-review of symptoms, access to the latest updates and trusted resources	Digital cloud, classification tool	Health data	Based on the information provided by the country through the data collection exercise
Canada	Canada Border Services Agency ArriveCAN	Official application for travellers to provide mandatory information when entering the country	Digital platform, digital cloud	Administrative data	Based on the information provided by the country through the data collection exercise

Canada	Mental Health and Substance Abuse Support Portal	Support and counselling for mental health and substance abuse users	Digital platform, digital cloud	Administrative data	Based on the information provided by the country through the data collection exercise
Canada	Employment and Social Development Canada eSin	Online use and processing of the Social Insurance Number (SIN)	Digital Cloud	Administrative data	Based on the information provided by the country through the data collection exercise
Canada	Health Canada COVID-19 Interactive Case Map and Data Summary	Data on COVID-19 cases, patients and situation in Canada	Digital platform, big data, data visualisation	Health and spatiotemporal data	Based on the information provided by the country through the data collection exercise
China	iShenzhen app	Contactless public services and introduction of "Citizen Pass" and "Business Pass"	Big data, cloud computing, AI, blockchain	Administrative data	Based on the information provided by the country through the data collection exercise
China	Jiangsu Health app	Medical consultation, remote diagnosis and treatment, drug delivery, inspection results and online payment	Big data	Medical data	Based on the information provided by the country through the data collection exercise
China	Action Plan on the Digital Transformation of SMEs	Digital resources to support digital management and operation of SMEs	Big data, AI, IoT, 5G	SME data	Based on the information provided by the country through the data collection exercise
France	CovidBot	Public health information and healthy authority recommendations on the COVID-19 situation	AI, open source	Data supplied by users, research and health data	Source 1; Source 2
Germany	Chatbot C-19	Official information on COVID-19 testing, symptoms and contacts	AI	Health services data	Based on the information provided by the country through the data collection exercise
Germany	Elterngeld Digital	Provision of digital access to parental allowance	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
Germany	Familienportal	Providing information digitally on existing family benefits	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
India	Electronic Vaccine Intelligence Network (eVIN)	Vaccine management	IoT	Administrative data, data generated by temperature loggers	Source 1; Source 2
India	Chatbot	Official information on COVID-19 via a WhatsApp chatbot	AI	Administrative data	Source

Indonesia	PeduliLindungi app	Contact tracing	Digital platform	Administrative data, data supplied by users	Based on the information provided by the country through the data collection exercise
Italy	Digital Arianna app	Contact tracing	Digital platform	Data supplied by users	Source 1; Source 2
Italy	COVID-19 Open Data Dashboard	Data on national public health situation including containment measures	Digital platform	Open data, metadata	Source
Italy	Digital Solidarity	Promoting innovative services and solutions	Public-private partnerships	N.A.	Source
Republic of Korea	Private-Public Partnerships for COVID-19 relief funds	Distribution of emergency relief funds to citizens	Data, interoperability	Personal data (national identification number, area of residence, contact information)	Based on the information provided by the country through the data collection exercise
Mexico	Susana Distancia Chatbot	Official information on COVID-19 preventive measures via a WhatsApp chatbot	AI	Administrative data	Source 1; Source 2
Russia	Unified Public Services Portal (UPSP) and Superservices	Information about state and municipal institutions and their public services	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
(Singapore)	HealthCerts	Vaccine certification	Platform, IT systems, interoperability	Administrative and health-related data	Based on the information provided by the country through the data collection exercise
(Singapore)	TraceTogether and SafeEntry apps	Contact tracing	Platform, device, IT systems	Administrative and health-related data	Based on the information provided by the country through the data collection exercise
(Singapore)	gov.sg WhatsApp channel	Daily updates on the COVID-19 situation	Platform, IT systems	Administrative and health-related data	Based on the information provided by the country through the data collection exercise
(Singapore)	National Appointment System for Vaccination	Vaccination management	Platform, IT systems	Administrative and health-related data	Based on the information provided by the country through the data collection exercise
South Africa	COVID Alert SA App	Contact tracing	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
South Africa	Temporary release of high-demand radio-frequency Spectrum	Support connectivity and service continuity during the COVID-19 pandemic	Bluetooth	Administrative data	Based on the information provided by the country through the data collection exercise

South Africa	COVID-19 TV and Radio Curriculum Support Programme	Virtual learning	Platform	Administrative data	Based on the information provided by the country through the data collection exercise
Turkey	Safir Depo Cloud Storage Software	Government as a Platform	Cloud, SaaS	Administrative data	Based on the information provided by the country through the data collection exercise
Turkey	Integrated Public Financial Management Information System Project	Financial transactions in the digital environment	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise
Turkey	COVID-19 Detection from Computed Tomography Images	Health diagnosis	AI	Health data	Based on the information provided by the country through the data collection exercise
Turkey	COVID-19 and Non-COVID-Related Viral Myocarditis Detection	Health diagnosis	AI	MRI images	Based on the information provided by the country through the data collection exercise
Turkey	Education Information Network (EBA)	Public online educational platform service	Digital platform	Educational data	Based on the information provided by the country through the data collection exercise
Turkey	Virtual Museum	Virtual visits of the museum and archaeological sites	3D	Administrative data	Based on the information provided by the country through the data collection exercise
United Kingdom	Cold chain monitoring of COVID-19 vaccine for NHS facilities	Vaccine management	Blockchain, IoT	Data generated by sensors and ledgers.	Source 1; Source 2; Source 3; Source 4
United Kingdom	GOV.UK Notify	Government as a Platform	Digital platform, open source	Administrative data	Based on the information provided by the country through the data collection exercise
United Kingdom	GOV.UK Pay	Government as a Platform	Digital platform, open source	Administrative data	Based on the information provided by the country through the data collection exercise
United Kingdom	GOV.UK Design System	Government as a Platform	Digital platform, open source	Administrative data	Based on the information provided by the country through the data collection exercise
United Kingdom	GOV.UK Coronavirus landing page	Government guidance and support in the COVID-19 situation	Digital platform	Administrative data	Based on the information provided by the country through the data collection exercise

European Union	Pan-European Privacy Preserving Proximity Tracing (PEPP-PT)	Standardised smartphone data processing tool to co-ordinate contact tracing	Open protocol	N.A.	Source
European Union	EU Digital COVID Certificate	Digital proof of vaccination against COVID-19, a negative test result or recovery from COVID-19	Digital platform	Health-related data	Source

Annex B. Selected practices that have contributed to the digital maturity of G20 members

Annex B presents a selection of practices developed by G20 members that have contributed to the overall digital maturity of governments, **mainly before the outbreak of the COVID-19 pandemic**. This group of practices draws upon the secondary research performed for the purpose of this Compendium, and a selection of those practices collected from G20 members (Annex C).

G20 member (or guest country)	Practices	Digital Tool
Argentina	International Symbol of Access	Digital platform
Australia	5G Strategy (2017)	5G
Brazil	Proof-of-Life social security benefits	Facial recognition/AI
Brazil	5G plans	5G
Brazil	National Plan for IoT (2019)	IoT
Canada	Spectrum Outlook 2018 to 2022 (2018)	5G
Canada	Algorithmic Impact Assessment	AI
Canada	Notify	Digital platform
China	National Implementation of the Financial Inclusion Initiative	Big data, AI, ICTs
China	5G/6G plans	5G
China	AI Innovation Action Plan for Institutions of Higher Education	AI
France	Citizens' Convention for the Climate	Digital platform
France	National Strategy on 5G (2021)	5G
France	National Strategy on AI (2018)	AI
France	Public Action Transformation Fund	Emerging technologies
France/Germany/Japan	Trilateral French-Japanese-German research projects on AI	AI
Germany	5G Strategy for Germany (2017)	5G
Germany	Data Ethics Commission	Data
Germany	AI Strategy of the German Federal Government (2020)	AI
Germany	Regulatory sandboxes	Emerging technologies.
India	National Health Systems Resource Centre Speech Recognition Support	Voice recognition/AI
India	National Strategy on AI (2018)	AI
Indonesia	National AI Strategy (2020)	AI
Italy	Strategy for Next Generation Access Network (2015)	5G
Italy	Support Programme for Emerging Technologies based on 5G	5G
Italy	Blockchain, AI and IoT Fund	Blockchain, AI, IoT
Italy	Italian Strategy for AI (2020)	AI
Italy	Data-Driven Approach to Tax Evasion Risk Analysis	AI/ML, data

Japan	5G plans	5G
Japan	Social Principles of Human-Centric AI	AI
Japan	AI Technology Strategy (2017)	AI
Mexico	Gob.MX Platform as a Service	Digital platform
Republic of Korea	People-Centred Plan for the Fourth Industrial Revolution	5G
Republic of Korea	National AI Ethical Guidelines	AI
Republic of Korea	Regulatory waivers	Emerging technologies
Russia	Unified Public Services Portal (UPSP) and Superservices	Digital platform
Russia	Information Infrastructure	5G, access points
Russia	National Strategy for the Development of AI (2019)	AI
Russia	Integrated Identification and Authentication System	Digital platform
Russia	Federal Register of State and Municipal Services	Digital platform
Saudi Arabia	National Strategy for Data and AI (2020)	AI, data
Saudi Arabia	Saudi Data and AI Authority	AI, data
Saudi Arabia	National Single Sign-On GOV.SA	Data
(Singapore)	Digital Government Blueprint (2020)	AI, data
South Africa	Electronic Bed Management System (eBMS)	IoT
Turkey	e-Government Gate	Digital platform
Turkey	e-Triage System	AI/ML
Turkey	5G plans	5G
Turkey	Anomaly Detection System in Foreign Trade	AI/ML
Turkey	Price Anomaly Detection, Market Basket Analysis and Price Tracking System	AI, data
Turkey	Turkish Brain Project: National Solution for the Detection of Brain Anomalies	AI, data
Turkey	Lesions and Calcified Areas in Mammography Images Detection using AI	AI, data
Turkey	Breast Cancer Detection using AI	AI, data, open source
Turkey	Liver Lesions Detection using AI	AI, data, open source
Turkey	National AI Strategy (under formal consultation)	AI
Turkey	TEKNOFEST Aerospace and Technology Festival	Emerging technologies
Turkey	Focus Group on AI - Assembly Of Turkish Scientist Abroad	AI
Turkey	Centre of Excellence of Data Analytics	AI/ML
United Kingdom	GOV.UK Platform as a Service	Platform
United Kingdom	Next Generation Mobile Technologies: A 5G Strategy for the UK (2017)	5G
United Kingdom	Data Ethics Framework	Data, AI
United Kingdom	National Cyber Security Strategy 2016 to 2021 (2016)	N.A.
United Kingdom	National Data Strategy (2020)	Data
United Kingdom	Digital and Technology Spend Controls	N.A.
United Kingdom	ICT Commissioning Playbook	N.A.
United Kingdom	Digital Marketplace	Platform
United Kingdom	AI Procurement in a Box	AI
United Kingdom	GOV.UK Design System	Platform, open source
United Kingdom	Digital, Data and Technology Profession Capability Framework	N.A.
United States	Automated Speech Recognition by Department of Homeland Security	AI
United States	Federal Communications Commission Strategic Plan 2018-2022; 5G FAST Plan (2018)	5G
United States	Federal Data Strategy Action Plan (2020)	Data
United States	Disability Adjudications in the Social Security Administration	AI
European Union	5G for Europe Action Plan (2016)	5G
European Union	Co-ordinated Plan on AI (2018)	AI

Annex C. Evidence as collected from G20 members from the data collection exercise

Annex C presents the raw data collected for the purpose of this Compendium **as provided by G20 members (or guest countries)**. The data collection exercise asked G20 members to submit information on national practices showing how digital tools contributed to public service continuity amidst the COVID-19 pandemic.

Argentina

Table.1. Argentina - App "Cuidar"

Country	Argentina
Initiative	App CUIDAR
Service	Early detection of COVID-19 cases, attention and follow-up in order to avoid the transmission of the virus.
Description	The App CUIDAR- COVID 19 enables the self-diagnosis of symptoms, provides assistance and recommendations in cases of compatibility with Coronavirus and supplies contact information of those cases to the sanitary authorities. The app is linked with a broader system which articulates the information gathered by the application with the health authorities in charge of care during the emergency, both from the national government and provinces. The app complements and assists prevention and care policies and, in particular, provides tools and resources for sanitary intervention of the Health Ministry at a national level. In addition, it allows for the emission of circulation certificates for essential and authorized personnel.
Digital Tool	Mobile app development. Application available for Android and iOS.
Data	Data is supplied by the users under a sworn statement. Personal data is protected by Law 25326.
Contribution to public service continuity	The application, in addition to being an essential tool to guarantee access to official information and self-diagnosis of COVID-19 symptoms for the citizens, contributes to the continuity of the mobility of essential workers due to its integration with the Unique Enabling Certificate of Circulation.
Main sources	https://www.argentina.gob.ar/jefatura/innovacion-publica/acciones-coronavirus/aplicacion-y-tableros-de-gestion https://www.argentina.gob.ar/noticias/cuidar-cuidado-y-transparencia-de-un-trabajo-en-sociedad

Table.2. Argentina – Chatbot COVID

Country	Argentina
Initiative	Chatbot COVID
Service	Provide official information to citizens regarding the pandemic and prevent misinformation
Description	The Secretary of Public Innovation and the National Ministry of Health worked together with Facebook to implement a chatbot for citizens to interact with in order to obtain official, accurate and secure information regarding COVID-19. The platform is available 24/7. It was designed to answer citizens' questions and provide fast and reliable advice about the Coronavirus. Faced with the need to diversify communication channels in order to minimize the effects of the spread of the Coronavirus, the Secretariat of Innovation, together with the Ministry of Health, launched a new automated line on WhatsApp for help and information.

Digital Tool	Artificial Intelligence and automatisation systems
Data	Data supplied by users
Contribution to public service continuity	The chatbot enabled the provision of reliable official information for citizens through digital channels during the COVID-19 pandemic.
Main sources	https://www.argentina.gob.ar/noticias/sumamos-whatsapp-ante-la-emergencia-sanitaria https://www.argentina.gob.ar/noticias/COVID-19-el-gobierno-trabajo-con-facebook-en-la-implementacion-de-un-chatbot-y-una-serie-de

Table .3. Argentina - Chatbot Line 144

Country	Argentina
Initiative	Chatbot Line 144
Service	WhatsApp line to assist people facing gender violence situations.
Description	The Secretary of Public Innovation and the Ministry of Women, Genders and Diversities extended the scope of Line 144, Argentina's assistance telephonic line for people going through violence situations because of gender motives. During the COVID-19 pandemic, a new and direct line in the WhatsApp application was established, which allows for several multiple conversations. Sending the word "hello" to the designated number initiates and activates a protocol, which alerts specialists and the interdisciplinary bodies and agencies to provide assistance and support. The channel is private, free and works 24/7, all year round and is available throughout the whole country.
Digital Tool	Automatisation systems and AI
Data	Data supplied by users
Contribution to public service continuity	The WhatsApp line enabled Argentina to continue providing support and advice at a national level to victims of gender violence during the COVID-19 pandemic. The telephonic line 144 continued functioning, while being complemented by the WhatsApp line.
Main sources	https://www.argentina.gob.ar/noticias/ampliamos-nuestra-capacidad-de-atencion-de-la-linea-144-whatsapp https://www.argentina.gob.ar/generos/linea-144

Table .4. Argentina – Vaccine digital credential

Country	Argentina
Initiative	Vaccine digital credential
Service	Digitalisation of COVID-19 vaccine certificate
Description	The Secretary of Public Innovation, together with the Ministry of Health, added to "MiArgentina" application (the unique citizen's digital profile to manage administrative procedures, book appointments, access credentials and receive personalized information), the digital certificate of the COVID-19 vaccine. The certificate contains the name, national registration number and vaccine data (name, lot, number of doses, time and place of application).
Digital Tool	App "MiArgentina" - mobile application development
Data	Each jurisdiction is responsible for the upload of information regarding vaccinated people.
Contribution to public service continuity	The vaccine digital credential enables the government and the citizens to keep track of vaccination records, enables the portability of personal information regarding vaccination, and makes the delivery of public health services more efficient
Main sources	https://www.argentina.gob.ar/miargentina/servicios/vacuna_COVID

Table .5. Argentina – Distance Administrative Procedures Platform

Country	Argentina
Initiative	Distance Administrative Procedures Platform (*Trámites a Distancia*, TAD)
Service	Online Platform for national administrative procedures

Description	TAD platform allows for the completion of up to 2229 administrative procedures in a fully digitalized manner. This means that all citizens can access administrative procedures regarding the National Public Administration from their homes or mobile devices. Therefore, TAD generates an interaction with the National Public Administration that is paperless and more efficient.In the context of the COVID-19 pandemic, this platform enabled a service related to the presentation of cases, which allows any citizen, personally or in representation of another individual, to make a case, answer reports requests and submit requested documentation, all in a remote and digital manner.
Digital Tool	Online platform development
Data	Data is supplied by the National Public Administration
Contribution to public service continuity	TAD platform became an essential tool for public service continuity during the COVID-19 pandemic, allowing citizens to complete their procedures in a secure, reliable, paperless and effective way, while minimizing the risks of COVID-19 spread by avoiding personal contact between citizens and state agencies.
Main sources	https://www.argentina.gob.ar/jefatura/innovacion-publica/administrativa/tramites-a-distancia https://www.argentina.gob.ar/noticias/COVID-19-tramites-en-tad

Table .6. Argentina – Juana Manso Virtual Platform

Country	Argentina
Initiative	Juana Manso Virtual Platform
Service	Remote education and learning
Description	The National Ministry of Education, together with Argentinian provinces developed in 2020 a virtual platform for remote education and learning. It contains virtual classrooms, an open and federal repository of educational resources and an investigation and monitoring module derived from the production of open data. Students and teachers can access their scholar activities through their mobile devices. Access is free and secure. This platform aims to provide an answer to the continuity of education and teaching in the context of the COVID-19 pandemic and to become a digital tool for future years.
Digital Tool	Online platform development
Data	Data supplied by the Ministry of Education
Contribution to public service continuity	Juana Manso Platform enabled the continuity of education, teaching and learning during the COVID-19 pandemic. It allowed the delivery of education in a free, accessible and secure way.
Main sources	https://juanamanso.edu.ar/acercade https://www.argentina.gob.ar/noticias/nueva-plataforma-federal-juana-manso-con-aulas-virtuales-gratuitas-y-seguras-para

Table .7. Argentina – International Digital Symbol of Access

Country	Argentina
Initiative	International Digital Symbol of Access
Service	Digitalisation of the International Symbol of Access
Description	The Secretary of Public Innovation, together with the National Disabilities Agency, digitalised the International Symbol for identification of vehicles transporting people with disabilities. The Symbol is now fully digitalised and available through a QR code, accessible from the app “MiArgentina”. It is estimated that with the previous method approximately 30.000 people with disabilities obtained their Symbol. With the new digitised Symbol, the universe of beneficiaries will reach approximately 1.300.000.
Digital Tool	QR code in app “MiArgentina”
Data	MiArgentina validates the biometric data with the National Registry of Persons (RENAPER) and, at the same time, it is validated together with the database of the Unique Certificate of Disability (CUD) of the National Agency for Disability (ANDIS). With this data crossing, MiArgentina issues the Digital Access Symbol.

Contribution to public service continuity	The digitalisation of the International Symbol of Access allowed people with disabilities to obtain their Symbol of Access during the COVID-19 pandemic in a remote and digitalised way, making the attainment of the Symbol more accessible, efficient and safe. It has been a significant step towards inclusion.
Main sources	https://www.argentina.gob.ar/noticias/el-simbolo-internacional-de-acceso-ahora-es-digital https://www.argentina.gob.ar/obtener-simbolo-internacional-de-acceso-digital

Australia

Table .8. Australia – Digital Identity and myGov

Country	Australia
Initiative	Digital Identity and myGov
Service	Simple, secure digital access to government services
Description	The Australian Government's Digital Identity system is transforming the way that Australians and Australian businesses engage with the government services they use every day. As Australia's digital economy expands, the Australian Government's interoperable Digital Identity system will be increasingly used across more government and private sector services. People can create a Digital Identity through a simple, streamlined online process, using the Australian Government's identity provider, myGovID. Once people have created a Digital Identity, they can reuse it across any government and commercial services that are connected to the Digital Identity system. The Digital Identity system is already used by over 2.5 million individuals, saving them time and money. It provides a way for people to log in to myGov, the primary portal to access Australian Government digital services. It also helps almost 1.3 million businesses to access over 77 Government services, improving their efficiency and productivity. Together, Digital Identity and myGov ensure people can access many of the government services they need digitally. The Australian Government is currently expanding both systems. • The Digital Identity system is developing the capability for biometric verification to enable a stronger identity strength and access to more services end to end digitally. In the future, this can save Australian families up to 4 hours applying for services and up to 4 weeks waiting to prove their identity. The Australian Government is also developing legislation to support a broader rollout of Digital Identity to services provided by states, territories, and the private sector. • myGov is being enhanced as a central place for people to discover, access and manage their interactions and services with the government. It will develop new capabilities to transform the experience for all Australians interacting digitally with the government. This follows five successful myGov Beta releases through 2020-21. Many Australians used Digital Identity and myGov to access government services and support safely and securely during the 2019-20 Australian bushfires and COVID-19 pandemic. Digital Identity is supported by the Trusted Digital Identity Framework (TDIF), which details the rules and requirements for governance, accreditation and operation of all parts of the system. This ensures a safe and secure digital identity system for the Australian economy.
Digital tool	Digital Identity
Data	Identity data, Customer data, Service Delivery data
Contribution to public service continuity	The Digital Identity system was used by Australian businesses to access services and support during the COVID-19 pandemic. It also enabled many Australians to access government services and supports through myGov. By leveraging these critical online capabilities, Australians were offered continuity of government services typically offered in shopfronts throughout one of the most difficult global events in recent memory.

	myGov provides access to people's COVID-19 Vaccination Certificates, which supports Australia's recovery from the COVID-19 pandemic. Strong authentication and verification methods like the Digital Identity system guard against fraud, and ensure the person applying for the certificate is who they say they are. The Australian Government has recognised that Digital Identity can also provide essential support in the case of natural disasters, demonstrated during the 2019-2020 Australian bushfires. Once a Digital Identity has been created, it removes the need to find identity documents such as birth certificates, passports which may have been lost, allowing for faster access to government services and relief payments.
Main sources	digitalidentity.gov.au beta.my.gov.au

Table.9. Australia – Digital improvements to myGov during the COVID-19 pandemic

Country	Australia
Initiative	Digital improvements to myGov during the COVID-19 pandemic
Service	Social services: Social security and welfare payments
Description	On Sunday 22 March 2020, Australia went into a widespread lockdown, and the demand for government support surged overnight. Services Australia (the agency that delivers social security and welfare payments), processed 1.3 million claims for JobSeeker Payment in 55 days, a claim volume normally processed in 2.5 years. Services Australia rapidly built and launched an online 'intent to claim' process for JobSeeker Payment in myGov (the online customer portal for Australian Government services), so people could register from the date they became unemployed, without needing to call or visit a service centre. The agency's team responsible for myGov planned, built, tested and deployed this feature in 36 hours. Within days, 890,000 Australians had used it, and within months, this number had grown to 3.4 million. In March 2020, Services Australia also expanded the capacity of myGov, from 90,000 to 300,000 concurrent users, to meet the unprecedented demand for digital services. The agency has since expanded this further, to allow for 500,000 concurrent users.
Digital tool	
Data	
Contribution to public service continuity	These improvements to digital systems provided a simple, helpful, respectful and transparent experience for customers who needed to access support, many of whom were accessing these kinds of payments for the first time, allowing them to get on with their lives. Improved online claiming alleviated the pressures on telephony and face-to-face service centres, which allowed more time for Services Australia staff to focus on customers with complex situations and needs. It also helped keep customers and staff safe, by reducing the number of people visiting face-to-face service centres.
Main sources	Services Australia Annual Report 2019-20. (2020). Available at: https://www.servicesaustralia.gov.au/organisations/about-us/reports-and-statistics/annual-reports/annual-report-2019-20 Senate Select Committee on COVID-19. (2020). Whole-of-Government Submission. 12 May. Available at: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/COVID-19/COVID19/Submissions The Hon Stuart Robert MP. (2020). Government Services in the digital age: the challenges, the plan and the delivery. (Speech). 7 July

Brazil

Table .10. Brazil – Expansion of digital identity

Country	Brazil
Initiative	Expansion of digital Identity
Service	Digital Identity to access public services

Description	The use of Digital ID has expanded greatly in Brazil during the pandemic. Today, more than 106 million Brazilians have digital Identity, with which they can access 3.000 public services. The main reason for promoting the use of Digital ID is because it makes digital processes safer. There are three different levels (or categories) of Digital ID in Brazil: Bronze, Silver and Gold. The last one is the safer level of access.
Digital tool	Face recognition and Digital Certificate
Data	Biometrics and Administrative data
Contribution to public service continuity	Digital ID has contributed to public services continuity by enabling online access to a number of services, which, otherwise, would be difficult to deliver. One example of such services is Proof-of-Life, which will be discussed ahead
Main sources	

Table 0.11. Brazil – COVID response

Country	Brazil
Initiative	COVID Response
Service	Emergency Aid
Description	In Combating COVID, Brazil implemented the Emergency Aid program, which benefited around 118 million citizens (55.8% of Brazilians citizens). 67.9 million individuals received the benefit directly. Databases containing information of lower-income citizens, already in place befora the pandemic, helped to reach out for the target-public. In addition, the Emergency Aid was publicized on a web portal and an app was designed to get citizens request for the benefit
Digital tool	Financial mobile App and Big Data
Data	Administrative data
Contribution to public service continuity	In order to implement the Emergency Aid, thousands of digital bank accounts were created for those would-be beneficiaries who did not have a regular bank account.
Main sources	

Table .12. Brazil – Updating status for social benefits

Country	Brazil
Initiative	Updating status for social benefits
Service	Proof-of-Life for social benefits
Description	Proof-of-life for more than 7 million pensioners and retirees that received social security benefits can now update their status and prove they are alive and still eligible for the benefit using mobile and facial recognition technology – this has contributed to public trust and has enhanced the acceptance of digitalization throughout the population.
Digital tool	Face recognition
Data	Biometrics and Administrative data
Contribution to public service continuity	These efforts helped the National Institute of Social Security (INSS) process and deliver status updates for retirees and pensioners and contributed to avoid or reduce the occurrence of pending social benefit renewals. It also enabled the continuity of regular transfers of social benefits to recipients in a time in which they were much needed
Main sources	

Table.13. Brazil – Digitalization of prioritized services

Country	Brazil
Initiative	Digitalization of prioritized services – implementation of online channels
Service	40+ services digitalised
Description	During the pandemic, a wide range of public services were digitalised. The transformation prioritized the 40 offline services with more social demand, across different areas of government, such as agriculture and livestock, the National Film Industry, health services, and others. Now, citizens can search for and access services using online channels that were made available

Digital tool	BPMS
Data	Administrative data
Contribution to public service continuity	All initiatives have contributed to public service continuity in the sense that they have provided online channels for citizens to access the services, avoiding the necessity of going in person to a governmental agency and contributing to keeping social distancing
Main sources	

Canada

Table.14. Canada - Notify

Country	Canada
Initiative	Notify
Service	Canadian Digital Service
Description	Notify is a service developed by the Canadian Digital Service platform team that allows government departments to send emails and text messages to people who use their services, at low costs and in just a few simple steps. It was built using open source code from the hugely successful GOV.UK Notify service. Notify has the potential to send 10 million notifications a day, and 60 per second, so when the pandemic hit, the Government of Canada was well-positioned to work with departments to integrate Notify into their service delivery. For example, in the early days of the pandemic, the "Get Updates on COVID-19" email notification service was stood up quickly, and by July, over one million notifications were sent to provide subscribers with timely and authoritative information right in their inboxes.
Digital tool	Digital Cloud
Data	Administrative data
Contribution to public service continuity	Notify is part of the Government of Canada's efforts to keep the public informed during the pandemic by enabling departments to send service updates quickly, securely and efficiently to their clients.
Main sources	https://notification.canada.ca/

Table.15. Canada - eSin

Country	Canada
Initiative	eSin
Service	Employment and Social Development Canada
Description	We worked with partners to design and launch a new digital service in just 10 calendar days. To do this, we stood up for the first time a new cloud-based protected B platform, trained officers on the process and software, managed high volumes of new and temporary SINs, and remained open and responsive to our clients and the public.
Digital tool	Digital Cloud
Data	Administrative data
Contribution to public service continuity	With the temporary closure of Service Canada centers, Canadians were no longer able to acquire their Social Insurance Number (SIN) at a physical location - the eSin service allowed clients to apply for a new SIN, confirm their SIN to apply for benefits or amend their SIN information online.
Main sources	https://www.canada.ca/en/employment-social-development/services/sin/apply.html

Table.16. Canada - ArriveCAN

Country	Canada
Initiative	ArriveCAN
Service	Canada Border Services Agency
Description	Hosted on a free and secure platform, ArriveCan is the Government of Canada's official application for travellers to provide mandatory information when entering the country. Available for iOS, Android and online, all travellers coming to Canada by land or air, are required to provide travel, contact and quarantine information through ArriveCAN, within 72 hours of their arrival

	Paper forms can be incomplete or inaccurate and can take days to process. To help provinces and territories protect their citizens, Canada has moved to a safer and faster paperless process.
Digital tool	Digital Cloud
Data	Administrative data
Contribution to public service continuity	ArriveCan is part of Canada's efforts to reduce the spread of COVID-19 and prevent importation of the virus. This information is crucial to Canada's response to COVID-19.
Main sources	https://www.canada.ca/en/public-health/services/diseases/coronavirus-disease-covid-19/arrivecan.html

Table.17. Canada - Mental Health and Substance Abuse Support Portal

Country	Canada
Initiative	Mental Health and Substance Abuse Support Portal
Service	Health
Description	In response to growing mental health and substance use concerns related to the COVID-19 pandemic, the Government of Canada launched the *Wellness Together Canada* website to support people across Canada and Canadians living abroad in both official languages. This platform offers resources at no cost, including immediate text support, wellness programs, and individual phone, video, and text counselling.
Digital tool	Digital Cloud
Data	Administrative data
Contribution to public service continuity	The Mental Health and Substance Abuse Support Portal is part of the Government of Canada's work to address the ramifications of COVID-19 on Canadians' mental health.
Main sources	https://wellnesstogether.ca/en-CA/faq

Table.18. Canada – GC Talent Reserve

Country	Canada
Initiative	GC Talent Reserve
Service	Treasury Board of Canada Secretariat
Description	GC Talent Reserve is a dedicated, single-window coordinated talent management tool for triaging digital and tech talent needs across the Government of Canada. It enables the flow of talent from areas of lower priority to areas of critical need, supported by data tracking and central coordination, offering departments a fast, efficient vehicle for sourcing qualified, available talent for a wide variety of needs and giving public servants a way to volunteer their skills where help is needed most. The site is a retrofit of Talent Cloud, an experimental staffing platform hosted under the Office of the Chief Information Officer (OCIO), created as a response to the impact of COVID-19. On March 16 the team began repurposing and upgrading features on its platform in order to create a centralized talent sorting centre for the COVID-19 situation. GC Talent Reserve went live on March 31.
Digital tool	Digital Cloud, Artificial Intelligence, Big Data
Data	Human resources and administrative data
Contribution to public service continuity	GC Talent Reserve is a digital first approach to the problem of how to identify, assess and allocate digital and tech talent in an emergency response context, allowing the Government of Canada to continue to respond to the needs of the country.
Main sources	GC Talent Reserve: Supporting priority talent needs for the GC Digital and Tech Community (canada.ca)

Table.19. Canada - COVID-19 Interactive Case Map and Data Summary

Country	Canada
Initiative	COVID-19 Interactive Case Map and Data Summary
Service	Health Canada
Description	This website provides a summary of COVID-19 cases across Canada; this includes detailed data about the spread of the virus over time and in different regions of the country and includes breakdowns by age and sex

	or gender. It also provides an overview of hospitalizations and deaths, testing, variants of concern and exposures.
Digital tool	Big Data and Data Visualisation
Data	Health and spatiotemporal data
Contribution to public service continuity	The COVID-19 Interactive Case Map and Data Summary enables Canadians to obtain up-to-date and detailed data about the spread of the virus over time and in different regions of the country.
Main sources	https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html?redir=1

Table.20. Canada – Open Call Initiative

Country	Canada
Initiative	**Open Call Initiative**
Service	Canadian Digital Service and Canada School of Public Service Digital Academy
Description	With the objective of helping other governments' digital response to COVID-19, *Open Call* is a living catalogue of free, easy to (re)use tools that address common challenges related to COVID-19. Open Call's catalogue includes free, open source tools being used by governments in Canada - and worldwide. No external procurement is needed to activate the service, meaning it's free for the Canadian public service, regardless of jurisdiction.
Digital tool	Digital Cloud
Data	Open data
Contribution to public service continuity	Given that governments across Canada are working on the same problems, including how to keep people informed about recovery efforts, track cases, provide live stats and empower residents to self-assess symptoms or understand benefit eligibility, Open Call assists in their digital response to COVID-19 by curating successful solutions to these challenges, and makes them freely available to government teams.
Main sources	https://opencall-appelouvert.alpha.canada.ca/#/

Table.21. Canada - Canada COVID-19 App and Self-Assessment Tool

Country	Canada
Initiative	Canada COVID-19 App and Self-Assessment Tool
Service	Health Canada
Description	This Government of Canada's Self-Assessment Tool allows individuals to review their symptoms, receive the latest updates, and access trusted resources.
Digital tool	Digital Cloud, Recommander/Classification Tool
Data	Health data
Contribution to public service continuity	The Canada COVID-19 App and Self-Assessment Tool is part of Canada's efforts to allow Canadians to have access to trusted healthcare resources and reduce the spread of the virus.
Main sources	https://ca.thrive.health/

China

Table 22. China – Jiangsu Health App

Country	China
Initiative	Internet+Healthcare: Jiangsu Health APP
Service	Social services: Healthcare services
Description	The government of Jiangsu Province aligns the procedures online and offline to provide one-shop healthcare services. The local healthcare authority has launched a service portal - Jiangsu Health APP, which covers services such as medical consultation, appointment & registration, remote diagnosis and treatment, drug delivery, fast track of inspection results as well as online payment. To protect privacy and confidentiality, only

	the patient him or herself has access to the account and medical files. With the app, patients can go to hospital without paper medical records, and avoid unnecessary and repetitive examinations. In the context of the COVID-19, Jiangsu Province has offered online fever outpatient services and launched virtual diagnosis and treatment platforms, so the specialized medical team can follow up the patients all over the Province, providing them with timely treatment and high-quality medical services.
Digital tool	Big data
Data	Medical data
Contribution to public service continuity	By the end of 2020, over 74 million access to the Internet + Healthcare services and 1.5 million visits to the online fever outpatient services in Jiangsu. The online diagnosis and treatment platform for COVID-19 has played an important role for the Province's combat against the pandemic - no death toll reported.
Main sources	http://www.gov.cn/xinwen/2021-03/23/content_5595186.htm

Table.23. China – iShenzhen

Country	China
Conduct	Digital Government APP - iShenzhen
Service	Internet + Government
Description	Shenzhen leverages technologies such as big data, cloud computing, Artificial Intelligence and blockchain to innovate public service delivery. A digital government app, iShenzhen, was launched in January of 2019, which covers individual services such as medical care, education, housing, transportation as well as business services such as entity registration, operation, employment, finance, and taxation. Two core service sectors - "Citizen Pass" and "Business Pass" are introduced to provide the above mentioned services. In the combat against COVID-19, iShenzhen plays an important role in providing contactless public services.
Digital Technology	Big data, Cloud computing, Artificial Intelligence, Blockchain
Data	Administrative data
Contribution to continuity in public services	iShenzhen now provides more than 8,000 service items, with over 50 million registered users and about 3 million daily active users on the platform.
Main source	http://www.sz.gov.cn/szzsj/gkmlpt/index

Table 24. China - Action Plan on the Digital Transformation of SMEs

Country	China
Initiative	Action Plan on the Digital Transformation of SMEs
Service	SME services
Description	*The Action Plan* underlines the importance of the following: employing ICTs in the fight against COVID-19 and supporting enterprises to resume production as soon as possible; encouraging the development of remote working, online education and other new models; building up digital platforms to channel industrial and financial resources; providing SMEs with access to digital resources; helping small and medium-sized enterprises to achieve digital management and operation, enhance intelligent manufacturing and cloud application, and promote the digital development of industrial clusters.
Digital tool	Big data, AI, IoT, 5G
Data	Public service
Contribution to public service continuity	Supported by the new generation of information technology and applications and with the goal of enhancing the ability of SMEs to cope with crises and consolidating the foundation for sustainable development. The *Action Plan* gathered a number of digital service providers for SMEs, and developed and promoted a number of digital platforms, system solutions, products and services that meet the needs of SMEs. In this way, we aim to help SMEs to resume production through digital and intelligent empowerment, thereby increasing development momentum and pursuing high-quality development.
Main sources	

Table.25. China - National Implementation of the Financial Inclusion Initiative in China

Country	China
Initiative	National Implementation of the Financial Inclusion Initiative in China

Service	Financial inclusion
Description	National Implementation of the Financial Inclusion Global Initiative is a three-year action plan (2018-2020) implemented in partnership with the International Telecommunication Union (ITU), the World Bank Group, and the Committee on Payments and Market Infrastructure. Since 2018, ITU has been collaborating with the China Academy of Information and Communications Technology (CAICT) to provide tailored technical support relevant to digital financial inclusion, with a focus on improving the regulatory framework, financial markets infrastructure, and ICT infrastructure. As part of the national implementation in China, pilot projects are being implemented in Yu County in Hebei Province. The project enhances the availability and inclusiveness of digital finance through training, digital agriculture platform and agricultural e-commerce platform. The project enhanced the existing collaborative approaches while enabling future partnerships, leveraging the access to affordable ICTs. By fostering a partnership ecosystem that adds values to all parties, the project contributes to policy objectives of eradicating poverty, promoting access to affordable ICTs and innovative Internet+ services.
Digital tool	Big Data, AI, ICTs
Data	Digital financial services
Contribution to public service continuity	By the end of 2020, the project has trained over 500 people in Yu County, building capacity as regards digital financial services and ICTs. An e-commerce and public service platform, Weizhou, was launched and over 11,000 pieces of information were released, assisting local residents to participate in businesses digitally. The Smart Agriculture Service Platform helps promote over 200 tourist projects and more than 100 kinds of agricultural and sideline products. The project sets up remote training courses and 75 offline service stations, significantly improves the availability and convenience of digital services.
Main sources	http://www.caict.ac.cn/ https://www.itu.int/net4/wsis/stocktaking/Prizes/2021/Winners

Germany

Table.26. Germany - Digital Information on Existing Family Benefits (Digitales Familienportal)

Country	Germany
Initiative	Digital Information on Existing Family Benefits (Digitales Familienportal)
Service	Social services
Description	The family portal brings together all relevant information on state family benefits, legal regulations and support options in one place. It is oriented towards the different life situations of families, for example "pregnancy and birth" or "family and work". Via "Your local advice search" users can enter their postcode to find offices and agencies in their vicinity where they can apply for benefits or get further counselling and support services. Since March 2020, up-to-date information on support services for families during the Coved 19 pandemic has been provided. Since July 2020, the C-19 chatbot has been integrated on the pages of the family portal. Various calculators and applications can also be accessed via the family portal, such as *ElterngeldDigital, Elterngeldrechner, Kinderzuschlags-Check, Wiedereinstiegsrechner, Familienpflegezeitrechner* and *Infotool Familienleistungen.* Using the Infotool *Familienleistungen*, (expectant) parents and family carers can, after entering a few personal situation, find out which family benefits they are likely to be entitled to and where they can find further information.
Digital tool	
Data	Administrative data
Contribution to public service continuity	In February 2019, the family portal recorded around 725,000 page views. In February 2020, there were approximately 1,100,000 page views. In February 2021, there were approximately 1,600,000 page views. Due to the pandemic, the family portal reached its highest level to date in January 2021 with over 2,000,000 page views.
Main sources	

Table .27. Germany - Providing Digital Access to Parental Allowance (*ElterngeldDigital*)

Country	Germany
Initiative	Providing Digital Access to Parental Allowance (*ElterngeldDigital*)
Service	Social services: Parental Allowance
Description	The effectiveness of family-related benefits increases with the provision of simple and up-to-date ways of accessing them. Therefore, the Federal Ministry for Family Affairs, Senior Citizens, Women and Youth aims to deliver more of its family benefits online. The provision of digital access raises the awareness of benefits in those who need them, reduces the amount of time spent on applying for those benefits, and frees up resources for the families. The aim is to improve access to family benefits and to simplify the application process. Especially in regards of the COVID-19 Pandemic, the provision of digital public services is an alternative to make of use of consulting services in administrative offices and therefore helped to reduce contacts. The digital application for parental allowance (*ElterngeldDigital*) already provides digital access to one of the most popular family benefits. The service aimed to make it easier for parents to navigate the often-complex application process for parental allowance. The service is being introduced in a step-by-step process, which started in October 2018 in the German states Berlin and Saxony. As of today, an electronically supported application for parental allowance is already available in seven federal states and will be extended to others in the near future. Providing consolidated digital information and enabling citizens to find and complete the necessary forms and related documents online helps streamlining application processes that previously required in person office visits or scheduling of appointments. In accordance with the Online Access Act (OZG), a fully digital application process for parental allowances is to be offered by the end of 2022. This includes digital authorisation by using the German ID card, submitting supporting documents in digital form as well as receiving administrative notices electronically, and hence, leading up to the paperless application for this benefit.
Digital tool	Digital public service
Data	Administrative data
Contribution to public service continuity	As the COVID-19 pandemic forced the closure of certain administrative offices for official hours and therefore reduced the possibilities for consultation with regards to the application process, the online service was able to diminish the impact of the pandemic by offering an easy access to the social service.
Main sources	Lebenslagen in Deutschland. Der Sechste Armuts- und Reichtumsbericht der Bundesregierung, Federal Ministry of Labour and Social Affairs, https://www.armuts-und-reichtumsbericht.de/SharedDocs/Downloads/Berichte/sechster-armuts-reichtumsbericht.pdf?__blob=publicationFile&v=2 (accessed on 11 June 2021)

Table .28. Germany – Chatbot C-19

Country	Germany
Initiative	Chatbot C-19
Service	Provision of information
Description	The German government invested heavily in extending health-related services to provide citizens, visitors of Germany, researchers, politicians, etc. easy-to-use options to gather information on-demand. One result of this initiative is the chatbot C-19 providing information for COVID-19 testing, symptoms, mental problems, contacts to health officials, etc. The chatbot is currently driven by predefined questions and conversation flows and is part of the long-term project *Dienstekonsolidierung Bund*. The Chatbot uses AI/NLU (Natural Language Understanding) components. Besides that, the Qanary framework was analyzed by a student group of Anhalt University of Applied Sciences. Project goal for the cooperation was to enable C-19 chatbot for data-driven question-answering functionalities.
Digital tool	AI
Data	
Contribution to public service continuity	Provision of information during the COVID-19 pandemic.
Main sources	https://www.cio.bund.de/Web/DE/IT-Dienste-Bund/Dienstekonsolidierung/dienstekonsolidierung_node.html https://c19.bundesbot.de

Indonesia

Table.29. Indonesia - PeduliLindungi

Country	Indonesia
Initiative	PeduliLindungi
Service	COVID-19 application
Description	*PeduliLindungi* is an application developed to assist relevant government agencies in tracking to stop the spread of Coronavirus Disease (COVID-19). This application relies on community participation to share location data with each other while traveling so that contact history tracing with COVID-19 sufferers can be carried out. The results of this tracing will make it easier for the government to identify anyone who needs to receive further treatment in order to stop the spread of COVID-19. Thus, the more people's participation using this application, the more it will help the government in tracing and tracking. Users of this application will also get a notification if they are in a crowd or are in a red zone, namely an area or village where it has been recorded that there are people infected with positive COVID-19 or there are patients under surveillance.
Digital tool	Big Data
Data	Administrative data
Contribution to public service continuity	*PeduliLindungi* as part of Health Surveillance support, which is carried out in accordance with regulations in the fields of health, disaster, telecommunications, informatics, and other related fields.
Main sources	https://pedulilindungi.id/

Italy

Table .30. Italy – Data driven approach to tax evasion risk analysis

Country	Italy
Initiative	"A data driven approach to tax evasion risk analysis in Italy" - the Italian Revenue Agency
Service	Detection of fiscal evasion
Description	The Revenue Agency's project aims to innovate processes in order to promote tax compliance and combat tax evasion. The project was selected and is being funded through the EU - DG Reform funding framework. The goal is to create an innovative technological model for risk analysis to prevent, detect and fight tax evasion, VAT fraud and the improper use of tax credits and other benefits. The project is scheduled to be completed in 16 months. The project aims at creating and integrated system to support decision-making through the use of innovative methodologies and technologies: • **Network Science:** a strong integration across different databases will be implemented in order to identify indirect relationships among subjects (for instance, relationships among companies). Thanks to such integration, taxpayers will be treated not merely as subjects, but as knots of their broader network of relationships. The network representation of data allows for an easier identification of "hidden" relationships that may be used for the purpose of tax evasion or for putting in place tax avoidance schemes. • **Information Visual Analysis:** The adoption of innovative human-machine interfaces to enhance analysts' skills will ameliorate decision-making processes. In fact, the use of tools and technologies for visual data investigation may enhance the cognitive abilities of analysts, making the process of acquiring information more intuitive. • **Artificial Intelligence:** The application of machine learning algorithms and the related development of risk indicators, across application domains, can accelerate decision-making processes and increase their relative levels of accuracy. Furthermore, the application of artificial intelligence for economic and fiscal purposes is part of the official guidelines issued by the Ministry of Economy and Finance.
Digital tool	Artificial Intelligence / Machine Learning

Data	Administrative data
Contribution to public service continuity	Methodological, scientific and organizational support in defining the evolution of processes and tools, in line with the best international experiences, to counter tax evasion or tax elusion schemes.
Main sources	Revenue Agency, press release 04/03/2021

The Republic of Korea

Table.31. Korea - Private-Public Partnership for COVID-19 relief funds

Country	Republic of Korea
Initiative	Private-Public Partnership for COVID-19 relief funds
Service	Social services
Description	The Ministry of the Interior and Safety (MOIS) was in charge of distributing emergency relief funds to the citizens. As the eligible recipients were 21.7 million households in the country, the government was not able to use the existing system designed to support the vulnerable groups. MOIS was able to design a service to distribute relief funds to all citizens in a short period of time by considering time, resource, and collaboration. It was not feasible to use one of the largest existing government systems such as HomeTax (digital taxation) and GOV24 (integrated government digital service portal) as these can only endure up to 100,000 users at the same time. In addition, it didn't seem effective to build a new system that can handle payments for over 20 million applications at once. With the aim of providing the funds quickly to the citizens with minimal inconvenience, the government decided to approach this project differently. The government and 18 out of 19 credit cards companies worked together to solve this challenge by linking the government central DB (determining the amount and applicants eligibility) with each company's system (processing application, identification and delivering the funds) through a dedicated network. As the credit card companies (designated identification service agencies by the government) already had their clients' identifier and personal information needed including area of residence, contact information, applicants didn't have to provide same information again and were able to receive the relief funds through a card company of their choice. Naturally, applicants spread over websites of 18 companies as well as offline channels such as banks and community centres, relieving pressure on certain sites. It was the first case of private-public partnership where the government used private infrastructure and service platform to deliver government services. It is meaningful that it has redefined such partnership, allowing government to move beyond the usual way of carrying out government ICT projects by traditional tender process.
Digital tool	Data, interoperability
Data	Personal information (national identification number, area of residence, contact information)
Contribution to public service continuity	By simply linking infrastructures without exchanging data, the Korean government was able to securely distribute funds to 99.1% of the population (68% of them through credit card companies) within three weeks without any system failure. It also saved the government about 56.5 billion KRW (approximately 41 million EUR) by using already existing systems and technology. Furthermore, the citizens were very pleased to receive government relief funds on their frequently used credit cards through an easy, quick application process. The service created by the private-public partnership will be ready to use right away when the government is required to distribute relief funds to the entire population in the future. In addition, this partnership has prepared the Korean government to better approach government services when they need to be launched securely, but also quickly.

	This service is still being used by many local governments as there are additional relief funds given out at the local level.
Main sources	

Russia

Table.32. Russia - Unified Public Services Portal and Superservices

Country	The Russian Federation
Initiative	Unified Public Services Portal and Superservices
Service	Public services
Description	The Unified Public Services Portal (UPSP) is a portal of State Services (Gosuslugi). This is a federal public (state) information system that provides citizens, entrepreneurs and legal entities with access to information about state and municipal institutions and the electronic services they provide. The Gosuslugi portal contains reference information for individuals and legal entities on the procedure for the provision of public services, including in electronic form, subject, department, life situation, organize a search, samples of documents are presented, links to services of state institutions and departments. Superservices are a new type of government electronic services that minimizes the use of paper documents and the need to visit government agencies. The service is built on the analysis of a person's life situation and the proactive provision of the necessary range of services, as well as assistance in obtaining the required benefits and payments – literally "in one click". Superservices are a part of the UPSP and are expected to cover 90% of the interactions of citizens and businesses with the state. Now 23 out of 25 planned Superservices are deployed, covering areas such as civil registration, education enrollment, online collection and payment of debts and fines, justice, filing applications to law enforcement agencies, retirement benefits, an appeal of fines, loss of a loved one, property relations, health, labor relations, assistance with disabilities, digital documents on education, social support, construction, registration of traffic violations and improvement rules, education in the Russian Federation for foreigners, business permits, labor migration. Superservices are the next step in the development of electronic services, when the state takes care of the documents while the citizen is busy with his own affairs. The service recognizes what a person needs in a life situation, selects services, reminds of due payments and sends a notification when everything is ready. No paper documents or queues, right on time.
Digital tool	Digital platform
Data	Administrative data
Contribution to public service continuity	The pandemic has made it possible to accelerate the digitalization processes in the Russian Federation. 50% of people have started to use digital services more often: now they are more actively using banking services and online shopping. In 2020, more than 40 new electronic services were launched on the **UPSP**, 234.6 million interactions were provided by the UPSP (+42 million services by 2019) and 84.3 million payments were made for a total of 84 billion rubles. At the same time, the number of authorizations on the UPSP amounted to 3.59 billion in 2020, approximately 10.5 million per day, which means that users, on average, 2 times a day use the portal to obtain the necessary information, check the status of consideration of their applications. The number of registered users on the UPSP reached 131 million people (+29 million people by 2019). In the field of digital public services one of the main goals of 2021 is the launch of a new version of the UPSP. It will become more technological and ready for the highest loads. Until January 1, 2023, all socially important services are planned to be transferred to electronic form. By the end of 2020, as part of the implementation of **superservices**, the following significant results were achieved:

	As part of the “Digital Enforcement Proceedings” superservice, on the UPSP services have been implemented to review the progress of enforcement proceedings and remote submission of a petition without visiting bailiffs in person. Within the framework of the "Labor relations online" superservice, on the UPSP and in the information and analytical system of the All-Russian database of vacancies "Work in Russia", the option of applying for unemployment benefits, as well as obtaining citizens of information about work activities in electronic form has been implemented. As part of the "Social Support Online" superservice, on the UPSP, the opportunity to give consent to be proactively informed about the possible emergence of rights to social support measures has been implemented. As part of the "Admission to a university online" superservice in 2020, on the UPSP the option of sending electronic applications for admission to a full-time budgetary form of study, obtaining information on the dates of additional entrance examinations, tracking a place in the competition lists, sending an electronic consent to enrollment and receiving a notification of successful enrollment in 54 state institutions of higher education, that took part in the pilot testing, have been implemented. In total, more than 20 thousand applicants used the service, more than 70 thousand applications were submitted, and more than 1200 people were successfully enrolled in training. As part of the implementation of the "Education in the Russian Federation for Foreigners" superservice in the state information system "Education in the Russian Federation for foreigners ", created by Rossotrudnichestvo (https://education-in-russia.com/) in 2020, the following services became available: search, comparison and selection of educational programs and educational organizations, as well as the opportunity to undergo career guidance. Within the framework of the "Registration of the Europrotocol online" superservice, the possibility of registration of the Europrotocol by individuals and legal entities through the mobile application "Compulsory MTPL Assistant" has been implemented throughout the Russian Federation. Within the framework of the "My Health" superservice on the UPSP, the possibilities of making an appointment with a doctor, including by electronic referrals, have been implemented. For other services (registration for medical examination, medical prophylaxis and examination, vaccination, feedback on health insurance issues, attaching to a medical organization and obtaining medical documents), the technical readiness of the UPSP is ensured, and the information systems of the pilot regions are being finalized. As part of the "Paperless transportation of passengers and goods" superservice on the territory of 6 constituent entities of the Russian Federation, an experiment was launched to introduce electronic registration of primary transportation documents (bill of lading and electronic waybill) for road transport with the participation of commercial organizations.
Main sources	https://www.gosuslugi.ru/superservices

Table .33. Russia – Receiving public services online

Country	The Russian Federation
Initiative	Receiving public services online
Service	Public services
Description	Receiving public services online via the Unified Public and Municipal Services Portal (UPSP).
Digital tool	The Unified Public and Municipal Services Portal (UPSP)
Data	Data from public information systems
Contribution to public service continuity	Currently, as part of the development of the UPSP and the National Data Management System, the federal executive authorities of the Russian Federation, together with the Ministry of Digital Development, Communications and Mass Media of the Russian Federation, are creating departmental data marts proving information to citizens and legal entities online by processing their requests sent through UPSP.

	Thus, starting June 18, 2021 the UPSP users are now able to check the vehicle history, check whether the vehicle is wanted by the police or has other restrictions. This service is implemented based on the vehicular data mart established by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation together with the Ministry of Internal Affairs, as part of the implementation of the National Data Management System Moreover, starting May 17, 2021, the UPSP allows receiving extracts from the Unified Register of Rights to Real Estate and Transactions Therewith (*Rosreestr*) utilizing the data mart. Until the end of the third quarter of 2021, requests for all types of the extracts from the Register can be submitted via a simple e-signature, and publicly available real estate information will become available online on the UPSP. In addition, the Ministry of Digital Development, Communications and Mass Media of the Russian Federation is planning to expand the UPSP functionality in 2021 – 2022 in terms of authorizing the UPSP to request the information on the user from relevant authorities and autofill said information when the user requests a public (municipal) service. At the same time, such a request will be sent strictly when the user is filling the information on the UPSP. Therefore, the user does not need to fill every form by hand or search the relevant paper documents – the UPSP will do it for them automatically. For example, when applying online for registration at the place of residence the UPSP will request data from the data mart of Rosreestr and confirm the possibility of registering the applicant and his family members in the living quarters. Also, when a citizen submits an application for subsidies and other payments the UPSP will check the available certificates in the civil registry office online and autofill the application with the received data. As a result, the time for filling out electronic applications will be significantly reduced, at the same time implementing the right of a citizen to receive information from public information systems online.
Main sources	https://www.gosuslugi.ru/

Table.34. Russia - Receiving public and business services online through the Digital Profile of individuals

Country	The Russian Federation
Initiative	Receiving public and business services online through the Digital Profile of individuals
Service	Public and business services
Description	Receiving public and business services online via the Digital Profile of an individual at the Unified Public and Municipal Services Portal (UPSP)
Digital tool	Personal account at the Unified Public Services Portal (UPSP)
Data	Data from public and other information systems
Contribution to public service contiguity	Pursuant to the Russian Federation Government Resolution No 710, dated 3 June, 2019 “On the implementation of the experiment to improve the quality and consistency of data contained in public information resources” (further– Resolution), a Digital Profile of an individual (further –DP) was established at UPSP by the Ministry of Digital Development, Communications and Mass Media of the Russian Federation, which is the most comfortable format for interaction of citizens with the State and business on the base of a protected public platform established taking into account necessary security measures (Unified identification and authentication system). The Digital Profile is a collection of all data about an individual which are in possession of public authorities and public information systems, as well as an aggregate of technical resources allowing an individual to manage this data to obtain various services. In 2020, together with the Bank of Russia in the framework of the DP, a service was established on the digital interaction between individuals and banks through Unified Public Services Portal (UPSP). It allows users to submit remotely their personal information to credit institutions and insurance companies, through personal account at UPSP, in order to receive services electronically without visiting the office. This includes data from the databases of the Federal Tax Service, the Pension Fund of the Russian Federation, the Ministry of Internal Affairs of the

	Russian Federation, the Federal Service for State Registration, Cadastre and Cartography (*Rosreestr*) and other. This information can only be available subject to a client's consent stored in the single register of "digital" consent. 2.3 million consent by citizens for the provision of any information to banks and insurance companies has been given in the timeframe since the service has been established. The peak number of consents issued daily reached 20 thousand. Thus, remote interaction between clients and banks was implemented without the need for additional provision of documents. As of June 2021, the Ministry of Digital Development, Communications and Mass Media of the Russian Federation digitized the process for receiving No. 2-NDFL form (personal income tax form), individual personal account statement in the Pension Fund of the Russian Federation and their transfer to the banks when taking out a loan products, electronic employment book statement, statements of pension awarded and social transfers and other documents and data. In order to initiate uploading the information from the Digital Profile to a bank, a user shall confirm this process of uploading the relevant information at a project-participant bank's website. Once complete, said bank connects to the DP through integration channels requesting the necessary information. Information will be sent automatically to the bank and then information on issued consents for data provision will be available in the client's personal account at UPSP. Information on disability, on issuance of a State certificate for maternity capital, data from Obligatory medical insurance (OMI) policies and subscription to a medical organization, informationon previously issued passports, extract from work record book for the period of labor activity, information on the classification of an individual as a pensionable or pre-pensionable ages are also available to an individual through DP. The Digital Profile plans implementing information on registered cars, welfare benefits, pro-active information on appointed measures of the social support, civil registry certificates, extracts from the Unified State Register of Legal Entities and Unified State Register of Private Entrepreneurs under the request from public authorities, an formation on the registration of an individual as a taxpayer, statement issued by the tax authority concerning the status of settlements in respect of self-employment tax, personal income details, payments made by insurance contribution payers towards individuals, information in accordance with the No. 3-NDFL form, information on a citizen's incapacity and limited capacity.
Main sources	https://lk.gosuslugi.ru/

Table .35. Russia - Federal project "Information Infrastructure" and connecting socially important facilities to the Internet

Country	The Russian Federation
Initiative	Federal project "Information Infrastructure" and connecting socially important facilities to the Internet
Service	Public service; Last mile
Description	Main objectives of the Federal project "Information Infrastructure" - Creation of a competitive, stable and secure infrastructure for high-speed transmission, processing and storage of data, accessible to citizens, businesses and authorities. - The development of communication infrastructure and the expansion of access to the Internet in sparsely populated, remote and hard-to-reach locations will help overcome the digital divide and provide citizens with access to modern digital services, distance education and telemedicine. - By 2024, access points to Wi-Fi and cell towers will appear in 26.9 thousand settlements with a population of 100 to 500 people. An underwater fiber-optic communication line will connect Chukotka with the mainland. - By the end of 2024, 4 spacecraft will be created for a highly elliptical satellite system, which will provide access to broadband Internet in hard-to-reach and remote areas, including in the Arctic zone and the Far East, as well as along the entire length of the Northern Sea Route. - Wi-Fi access points will appear in school classrooms, and 5G networks will be deployed in 10 cities with a population of one million. **Connecting socially important facilities to the Internet** is carried out within the framework of the federal project "Information Infrastructure" of the national program "Digital Economy of the Russian Federation. Connecting socially important facilities to the Internet contributes to the development of communication in remote and small settlements. These are educational organizations, feldsher-midwife stations, government and local authorities, as well as election commissions, culture facilities, district police stations and others. When these facilities are

	connected, communication centers are created in each settlement. This makes it possible to connect all households in the settlement to high-speed access.
Digital tool	Access points
Data	Any data
Contribution to public service continuity	Within the framework of the federal project "**Information Infrastructure**", citizens have access to the Internet using Wi-Fi access points in 12,243 small settlements with a population of 250 to 500 people. A large-scale project for the construction of an underwater fiber-optic communication between Kamchatka and Chukotka in the Arctic zone has started, which will make it possible to provide this remote region with communication. Priority frequency ranges have been identified for deploying ultra-high-speed 5G wireless communication networks using domestic equipment. This will increase the availability of the Internet for households. By the end of 2020, more than 41 thousand **socially important facilities** received access to the high-speed Internet. The goal is to connect more than 80 thousand socially important facilities to the Internet by the end of 2021.
Main sources	https://digital.gov.ru/ru/activity/directions/870/ https://digital.gov.ru/ru/events/40322/

Table .36. Russia - Integrated Identification and Authentication System

Country	The Russian Federation
Initiative	Integrated Identification and Authentication System
Service	Public service
Description	The federal state information system "Unified identification and authentication system in the infrastructure providing information and technological interaction of information systems used to provide state and municipal services in electronic form" must provide authorized access to information interaction participants in a unified identification and authentication system to information contained in state information systems, municipal information systems and other information systems, for the following purposes: a) provision of state and municipal services, including services provided by state and municipal institutions and other organizations in which a state assignment (order) or a municipal assignment (order) is placed; b) performance of state and municipal functions; c) formation of basic state information resources determined by the Government of the Russian Federation; d) interagency electronic interaction; e) other goals stipulated by federal laws, acts of the President of the Russian Federation and acts of the Government of the Russian Federation. IIAS is designed to provide authorized access to information in government and other information systems.
Digital tool	Digital platform
Data	Administrative and personal data
Contribution to public service continuity	Completion of IIAS: as part of an experiment with the financial sector and other organizations in pursuance of the Decree of the Government of the Russian Federation No. 710, Integrated Identification and Authentication System – IIAS – has been refined in terms of creating a digital platform for the exchange of data between citizens and organizations in electronic form with their consent, including for the provision of financial services and services, which makes it possible to save information in the user profile of the IIAS, as well as with the user's consent to provide this information to third parties, including financial institutions. Currently, the digital platform continues to being developed in terms of expanding its functionality and adding new information.

Main sources	https://digital.gov.ru/ru/activity/directions/13/

Table .37. Russia - Federal register of state and municipal services (functions)

Country	The Russian Federation
Initiative	Federal register of state and municipal services (functions)
Service	Public service
Description	As part of the development of the federal state information system "The Federal Register of State and Municipal Services (Functions)", a subsystem for the provision of state and municipal services has been developed – the portal of state services (PSS). PSS allows user to receive, process and provide the result of the provision of public services according to the application received from the Unified Public Services Portal UPSP.
Digital tool	Digital platform
Data	Administrative data
Contribution to public service continuity	Currently, the possibility of processing applications for 50 state (municipal) services from the list approved by the order of the Government of the Russian Federation dated No. 2113-r has been implemented. By 2022, the implementation of another 50 services from the specified list will be provided, and by 2023 the remaining 106 services from the list will be covered. Agreements are concluded with the executive authorities of the constituent entities of the Russian Federation on the use of PSS. The use of the PSS for the subjects is free of charge. The widespread introduction of PSS in the future will make it possible to provide state (municipal) services in each of the state authorities on the territory of the Russian Federation
Main sources	https://frgu.gosuslugi.ru/

Table .38. Russia - Digitalization and process automation within the frameworks of the Digital Economy (search platform)

Country	Russian Federation
Initiative	Digitalization and process automation within the frameworks of the Digital Economy
Service	Search platform for patent information and means of individualization
Description	A new search platform enables a global full-scale search in Russian and global collections of patent documents, providing citizens and organizations with effective and open access to the global and national collections of patent documents, as well as information on means of individualization. The platform comprises the following services: • Data collection • Data storage and processing • Application management • User management • Program interfaces (API) • Development kit (SDK) • Patent Search • AI search in various sources of patent and scientific information

	• Sequence listing search
Digital tool	AI, Big Data, Multilingual, Search, API, SDK
Data	National and Global Patent Collections and Information on Means of Individualization
Contribution to public service continuity	The platform allows a wide range of users and applicants to carry out the smart search for information on IP rights objects using various sources. The platform also enables the implementation of services using the Platform infrastructure. The business community will be able to develop their specialized applications to study patent information, as well as commercialize their solutions on the market.
Main sources	Within the frameworks of the federal project "Information Infrastructure" of the national program "Digital Economy of the Russian Federation", *Rospatent* implements activities to create and operate information systems for digitalization and automatization of IPRs registration and protection procedures.

Table.39. Russia - Digitalization and process automation within the frameworks of the Digital Economy (3D visual)

Country	Russian Federation
Initiative	Digitalization and process automation within the frameworks of the Digital Economy
Service	3D visual representations of IPR objects search and comparison
Description	Development and implementation of the information system supporting storage, comparison and similarity search of the objects for IPR protection in 3D formats to ensure the technical capability of handling and processing 3D visual representations of objects for IP rights protection filed for the state registration.
Digital tool	AI
Data	3D visual representations of IPR objects
Contribution to public service continuity	This service allows to store, search and compare filed 3D visual representations of objects for IP rights protection in an automated manner.
Main sources	Within the frameworks of the federal project "Information Infrastructure" of the national program "Digital Economy of the Russian Federation", *Rospatent* implements activities to create and operate information systems for digitalization and automatization of IPRs registration and protection procedures.

(Singapore)

Table .40. Singapore – Digital initiatives to support public health response to COVID-19

Country	Singapore
Initiative	Digital tools to help disseminate timely and accurate information to Singaporeans and to support public agencies to better manage the crisis
Service	Whole-of-government services to support public health response to COVID-19
Description	Technology has played a key role in Singapore's fight against COVID-19. The strong digital infrastructure and in-house engineering capabilities built over the years enabled the Singapore government to develop and deploy technology rapidly to support the public health response. Several of such initiatives rolled out include:

	• The National Appointment System (NAS) for COVID-19 Vaccination: The NAS for COVID-19 Vaccination enables the coordination of vaccine demand and supply to support phased rollout of the vaccine nation-wide. Members of public can register and book appointments online to secure both doses of the vaccine, after completing an eligibility questionnaire. It is also deployed at various community centres to assist seniors in booking appointments, as well as vaccination centres, polyclinics, and Public Health Preparedness Clinics to check in patients. • HealthCerts: The Singapore government has developed a globally inter-operable standard for pre-departure COVID-19 test result and vaccination certificates ("HealthCerts") to facilitate the safe resumption of travel. The Notarise system endorses locally issued certificates and the Verify system enables checks on the authenticity of such certificates. The government has also open-sourced the HealthCerts standard and technology and partnered private sector players to develop interoperable solutions. • TraceTogether and SafeEntry: Facilitates contact tracing by exchanging Bluetooth proximity signals between devices. As of July 2021, there are 5.3 million users in the TraceTogether Programme (App or Token), which is nearly 99% of all residents. These digital contact tracing tools have helped reduce the time taken to identify and quarantine close contacts. • Gov.sg WhatsApp Channel: The channel pushes out daily updates on the situation on the COVID-19 situation in the four official languages in Singapore to subscribers.
Digital tool	Apps, digital devices, IT systems
Data	Administrative, health-related data
Contribution to public service continuity	As stated in the description above
Main sources	More information can be found at www.smartnation.gov.sg/whats-new/press-releases/a-smart-nation-for-a-future-ready-singapore

South Africa

Table .41. South Africa – Virtual learning

Country	South Africa
Initiative	Virtual learning
Service	Coronavirus COVID-19 TV and radio curriculum support programme
Description	Teachers delivering lessons live to learners on TV and Radio Stations. The public broadcaster (the South African Broadcasting Corporation) and DSTV channel 180 availed channels entirely dedicated to education. In addition to that, the national broadcaster added two studios where the broadcast of the virtual classrooms would take place. In these studios, teachers were delivering lessons live and real time to learners. This was done through virtual classrooms, teaching learners as they would in a classroom. Through E.tv, the government also allocated a dedicated channel for three months on the open view platform for learners. Further to the initiatives above, the government availed, broadcast of lessons on community radio stations around the country. The use of radio and television to introduce virtual classes necessitated by COVID-19 in South Africa demonstrates that South Africa is capable of transforming the education sector towards the 4IR. Moreover, the South African government in partnership with private network providers offered zero-rated applications and educational websites. This means that private network operators offered monthly data allotment effectively free for applications or website. These applications and websites were used frequently by pupils or students from various schools or institutions in South Africa to access freely downloadable educational platform with more than 2000 electronic readers in the indigenous languages of the country via 2Enable App and major network operators' platforms.
Digital tool	TV, Radio mobile applications and collaboration platforms
Data	Administrative data
Contribution to public service continuity	These interventions assisted most learners and students to switch to online platforms through TV, Radio, social media applications and collaboration platforms such as Microsoft Teams, Zoom, Skype to mention a few. The Department of Basic Education has also published study material including textbooks, worksheets, revision booklets, and study guides on their website. The DBE website has been updated with current and relevant content inclusive of reading resources and websites. Other content which is available on websites of our partners has also been made available through links on the DBE website on

	www.education.gov.za. Organizations joined the effort to offer free online learning for school pupils during the lockdown. However, the greatest challenge remained the targeting of learners in rural areas, especially those without access to the Internet.
Main sources	Mhlanga, D.& Moloi, T. 2020. COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa?. Education Science, 180(10): 1-11. Available from: https://www.google.co.za/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwj2gM6U9tfxAhUEY8AKHd2IBrYQFjACegQIHhAD&url=https%3A%2F%2Fwww.mdpi.com%2F2227-7102%2F10%2F7%2F180%2Fpdf&usg=AOvVaw0Eh6t3eHyphuMnrm87dgD9 [Accessed:10 July 2021].

Table .42. South Africa – Contact Tracing

Country	South Africa
Initiative	Contact Tracing
Service	COVID Alert SA App Community
Description	Contact tracing is a process used to slow the spread of infectious diseases like COVID-19. Contact tracing means working with people who contract COVID-19 to identify their 'close contacts' – which means people they have been in direct contact with over the past 14 days and possibly infected with COVID 19 as a result. Doing this manually takes time, and there's always a risk of missing close contacts. The app uses Bluetooth signals to exchange 'random codes' (random numbers that change every so often) with other COVID Alert SA app users. This happens when their smartphones are within 2 metres of each other for more than 15 minutes. It's like the devices have given each other a digital handshake. The random codes exchanged at the time of the 'digital handshake' are stored in a log on each phone for two weeks.
Digital tool	TV, Radio mobile applications and collaboration platforms
Data	Administrative data
Contribution to public service continuity	COVID Alert SA makes contact tracing happen quickly and efficiently. This app helps us to work together to stop the spread of COVID-19 using Bluetooth contact-tracing technology – which simply tracks close contact (proximity) between smartphones, and not the actual location of the smartphones.
Main sources	Link: https://sacoronavirus.co.za/guidelines-and-relief/ [Accessed: 10 July 2021

Table .43. South Africa - Temporary Release of high demand radio-frequency

Country	South Africa
Initiative	Temporary Release of high demand radio-frequency Spectrum to support Connectivity and Service Continuity during COVID-19
Service	Release of Temporary Spectrum
Description	Release of High Demand Radio-frequency Spectrum on a temporary basis to ease network congestion and ensure the delivery of public and business services during the pandemic.
Digital tool	Bluetooth
Data	Administrative data

Contribution to public service continuity	The temporary release of spectrum to licensees continues to ease network congestion and assists in maintaining good quality broadband services, allowing for lower cost access for consumers. This initiative accompanied the zero rating of 651 Higher education websites, 413 primary and secondary education websites, and 15 Health websites. This enabled the provision of health and education services during the pandemic and supported the development of virtual classrooms
Main sources	Links: https://www.icasa.org.za/news/2021/icasa-extends-temporary-radio-frequency-spectrum-assignment-for-licensees https://sacoronavirus.co.za/guidelines-and-relief/ [Accessed: 10 July 2021]

Turkey

Table .44. Turkey - Consumer Information System (TÜBIS)

Country	Republic of Turkey
Initiative	Consumer Information System (TÜBIS)
Service	Public Services
Information	TÜBIS provides consumers with the opportunity to submit their complaints electronically to the Consumer Arbitration Committees via an e-government portal. Consumers are also able to track applications and decisions taken by the Committee via TÜBIS.
Digital tool	TÜBIS uses the Republic of Turkey's national E-Government identification system. TÜBIS also has a mobile application called "Mobil Tüketici" (Mobile Consumer) for IOS and Android devices.
Data	TÜBIS processes personal consumer information, as well as the information about the consumer complaint submitted. TÜBIS also uses consumer dispute resolution committee decisions, and judicial information about the appeal process of the complaint thanks to integration between TÜBIS and the National Judiciary Network Project (UYAP).
Contribution to public service continuity	TÜBIS facilitated the consumer dispute resolution process by promoting a faster, easier and cheaper way for consumers to submit their complaints. This increased citizen trust in the state. TÜBIS also created a greater extent of governance between executive and judiciary functions in Turkey by simply making them connected through the system.
Main sources	https://tuketicisikayeti.gtb.gov.tr

Table 45. Turkey - Reduction of Bureaucracy and Digital Turkey

Country	Republic of Turkey
Initiative	Reduction of Bureaucracy and Digital Turkey
Service	Digital Services (including citizens, enterprises and public institutions services) of Ministry of Trade
Information	It is an integrated system that allows access to electronic applications through a single platform. 619 services registered related to relevant/associated institutions and Turkish Exporters Assembly (TIM) are developed by the Ministry of Trade in the Service Inventory Management System (HEYS) module within the scope of The Electronic Public Information Management System (KAYSIS). 374 of these services have been integrated into the e-Government Gateway and 6 services have been continued to integrate. (The number of G2B is 228, G2C is 89 and G2G is 57)
Digital tool	Internet Site, Information Portal
Data	Administrative data
Contribution to public service continuity	These efforts provided access to all public services from a single point, to present public services to the citizens, enterprises and public institutions effectively and efficiently with information and communication technologies and for sure to reduce bureaucracy, especially under COVID-19 pandemic conditions.
Main sources	E-Government Gateway (www.türkiye.gov.tr) Electronic Public Information Management System (KAYSIS) (www.kaysis.gov.tr)

Table 46. Turkey - Reduction of Bureaucracy and Digital Turkey

Country	Republic of Turkey

Initiative	Integrated Data Analytics In Risk Analysis
Service	Custom Services
Information	Customs administrations are responsible for implementing a wide range of policies in areas as diverse as collection of duties and taxes, defence of security and safety, compliance with trade regulations. One of the main problem that custom administrations are smuggling that is the clandestine import of goods or the evasion of taxes by circumvention of customs controls. Smuggling detection involves the physical inspection of items. These controls must be quick and effective so as not to interrupt trade flows in a fast-moving economy. However, due to the large increase in trade over the last few years and the limited manpower and customs materials, it is impossible to carry out a physical examination of all shipments. Via automated risk analysis systems, eligibility and risk targeting approaches are implemented to ensure a proper balance between customs controls and the facilitation of legitimate trade. The existing systems are based on simple selectivity criteria, with a focus on the goods, the importer, the exporter, the carrier plus a random target. The exchange of information between customs authorities is also strengthened. Most of the existing risk analysis systems cannot make use of unstructured data, causing it to ignore a large amount of all available data. The importance of data mining in the field of customs risk management has already been underlined by the World Customs Organization and the European Union. To enlarge analyzing capacity a data mining project has been launched in 2018 in the Turkish Customs Administration (TCA). In the project predictive modelling, anomaly detection and other data mining methods are applied in all modules in accordance with the data structure. Ministry of Trade always seeks to strengthen risk management and analytical capacities, making its Customs control operations at seaports, airports, land borders and inland more effective. In addition to Data Mining tools, the Project has six more components. These are; Data Quality, Rule Engine, Real-Time Analytics, Text Mining, Social Network Analysis and Dashboards, Inquiry and Reporting tools. The project's key activities as shown below. • Take advantage of the international experience and the best country practices (know-how) in the area of risk analysis and integrated data analytics • The existing risk profiles in the risk analysis system analyzed and transferred to the data mining system in a more efficient format • Various risk rules and models which are based on the best country practices and international experience added to the risk analysis system • Text mining in free text fields • Detection of an anomaly in customs procedures • Current risk profiles examined by machine learning methods and got improvement proposals • Data quality studies on various data sets • Predictive models (Using the methods of machine learning, artificial intelligence etc.) • Social network analysis With all these, TCA has a risk analysis system that has been further strengthened.
Digital tool	AI/ML
Data	Administrative data
Contribution to public service continuity	With Data Mining Project, there are fundamental contributions of TCA's risk analysis system. The contributions are as below: • Simultaneous access to data from different sources • Ensuring the effective use of risk scoring systems • Increasing selectivity in risk analysis by analyzing high-scale data • Focusing on more risky areas in real-time

	• Use of advanced techniques such as artificial intelligence, machine learning etc. in Risk Analysis studies Following the above expectations, all of the tools in the Project were provided under the name of Integrated Data Analytics.
Main sources	There is an intra system. There is no web address or connection address.

Table .47. Turkey - Anomaly Detection System in Foreign Trade

Country	Republic of Turkey
Initiative	Anomaly Detection System in Foreign Trade
Service	Custom and Foreign Trade Services
Information	Since trade volume and also several transactions in customs increase day by day, automated systems are getting more important to ensure optimal inspection custom administrations pay attention. Changes in world trade and the rise in international economic and commercial ties have had a huge effect on customs administrations. The growth and diversity of the illicit movement of goods, vehicles and human beings have also been observed following the increase in international economic and commercial relations. To enhance their targeting/selectivity processes, many customs administrations are concentrating on other activities for maintaining more effective automated systems, such as data mining, machine learning and artificial intelligence techniques. These techniques are the process of analyzing vast datasets to reveal valuable information. Anomaly Detection System in Foreign Trade has been established to determine daily anomalies in foreign trade statistics according to country, goods and company breakdowns by data mining and statistical methods. The adapted methodologies determine low custom values or quantity by country and good pairs. This system can allow the users to identify the anomalies in good and country pairwise as well as vice versa. Moreover, users will observe the time series of anomalies in the system in the near future.
Digital tool	AI/ML
Data	Administrative data
Contribution to public service continuity	Via Anomaly Detection System in Foreign Trade users can; • identify the sudden increase and decrease • observe the historical changes in any good, country or firm as well as good and country pairwise • investigate the anomaly trend of any dimension This system also helps policymakers to easily observe the statistics and trends.
Main sources	There is an intra system. There is no public access to web address.

Table 48. Turkey - Center Of Excellence Of Data Analytics

Country	Republic of Turkey
Initiative	Center Of Excellence Of Data Analytics
Service	Public Services
Information	The main functions of our Administration are domestic, foreign trade and customs procedures. The data of these processes should be collected, processed and protected in safe environments._ In addition, through the analysis of data, there is a need to support policymakers of our Administration with tools such as scenario creation, simulation and forecasting. _ In line with these needs, studies are carried out to establish the Center Of Excellence Of Data Analytics within our Ministry. We created scenarios related to the field of duty of our Ministry. i We use artificial intelligence and machine learning technology on the data in these scenarios. Scenarios are made up of subjects that fall under the ministry's field of activity. There are special working teams for these scenarios. The project's key activities as shown below: • Forecasting • Technological solutions

	• Text mining in free text fields • Early warning/alarm • Simulation • Data quality studies on various data sets • Predictive models (Using the methods of machine learning, artificial intelligence etc.) • Social network analysis • Chatbot/assistant • Dashboard design
Digital tool	AI/ML
Data	Administrative data, external data (other institution, international database etc.)
Contribution to public service continuity	Via Center Of Excellence Of Data Analytics Project in Foreign Trade users can; • identify the data • cleanup data • increase data quality • make short-term and long-term forecasts • automate manual operations • use relationship dashboard to data scope • become a data scientist • minimize manpower This system also helps policymakers to easily observe the statistics and trends.
Main sources	www.kolayihracat.gov.tr

Table 49. Turkey – Easy Export Platform (EEP)

Country	Republic of Turkey
Initiative	Easy Export Platform (EEP)
Service	Public Services
Information	EEP is established to ensure our exporters closely follow global commercial data. Within this context, there is various information for exporters to make healthy projections about their future work. AI-based The Smart Export Robot, one of the most important modules of the platform, operates in four layers using more than 10 million lines of data for more than 10 thousand data fields compiled from national and international sources, together with the export history of companies and provides target market recommendations to companies by calculating a score for each country. The users also have the flexibility to rank the target markets we offer according to their preferences. The platform also provides our companies with information on which products they can export together. In the country and sector pages of EEP, a wide range of information from general socio-economic indicators of the countries to tax rates is available for 23 sectors and more than 190 countries. The platform serves our exporters with a module containing information about 18 million buyers to enable users to find importing companies in their target markets, a personalized profile page where exporters can monitor their export history, a training module with more than 100 resources and certified training, a step by step guide explaining export processes, Turkish / English mail templates for exporters with foreign language barriers, a legislation module mainly on foreign trade legislation and a chatbot answering users' questions about the entire platform for 24/7.
Digital tool	AI
Data	Administrative data, Public data sources, Private data sources
Contribution to public service continuity	EEP provides all the information necessary for our exporters While providing a wide range of information in a single channel, EEP provides consultancy to our exporters on market selection by using developing technologies such as machine learning algorithms. In the platform, up-to-date data and information obtained from public paid and administrative databases.
Main sources	www.kolayihracat.gov.tr

Table 50. Turkey – Digital Customs in Exports

Country	Republic of Turkey
Initiative	Digital Customs in Exports
Service	Public Service
Information	Thanks to this Project; the documents attached to the customs declaration and the documents used during the customs procedures and the establishment of these transactions are aimed to be processed completely electronically in export operations. We removed all the paper-based documents in exports and put electronic ones instead.
Digital tool	BILGE (Customs Declaration System)
Data	Declaration Data
Contribution to public service continuity	Declarants or brokers are not required to be in customs for monitoring and carrying out an export operation.
Main sources	http://bilgev2.gtb.gov.tr/BilgeV2Kurulum/publish.htm

Table .51. Turkey - Price Anomaly Detection, Market Basket Analysis and Price Tracking System based on Web Scraped Data

Country	Republic of Turkey
Initiative	Price Anomaly Detection, Market Basket Analysis and Price Tracking System based on Web Scraped Data
Service	Public Service
Information	Based on the goals 355th and 473rd in the Turkey's 11th National Development Plan about the production and use of artificial intelligence technologies and TurkStat's strategy of using alternative data sources in the production of official statistics with the help of big data technologies, TurkStat and TUBITAK have started developing a big data project consist of Consumer Price Index Estimation, Market Basket Analysis and Price Tracking System modules by using web scraped product data. To collect online product data from web pages, a web scraping system that goes through daily data from pre-defined websites and stores them in our Hadoop based big data system is developed. Daily product data including price, product title, product description and unit of measurement from 117 different websites are daily collected by using a web scraping system. After extracting relevant information about the product from the web page which is in a semi-structured form, data is transformed, pre-processed, duplicated and COICOP assigned to each product by using the NLP techniques with the help of machine learning and deep learning models. The goal of the project is to produce alternative indicators, to develop a price anomaly detection system, to establish a price tracking system, to build a log analysis system based on market basket products.
Digital tool	Big Data, Artificial Intelligence
Data	Web scraped data (semi-structured)
Contribution to public service continuity	• Validation of product data collected from the field by using web scraped data • Establishment of a price tracking system for flight, bus, hotel and package tour prices for Consumer Price Index • Reduction of data collection cost • Collection of broader product and services data from different sources for Consumer Price Index
Main sources	

Table 52. Turkey – Virtual Museum

Country	Republic of Turkey
Initiative	Virtual Museum
Service	Public Services
Information	The website www.sanalmuze.gov.tr is created free of charge by the Ministry of Culture and Tourism to visit museums and archaeological sites virtually, to provide worldwide access to museums and archaeological sites, and to promote cultural heritage to wider audiences in the virtual environment. The website www.sanalmuze.gov.tr, which was launched on March 25, 2020, has been visited approximately 14.000.000 times to date.
Digital tool	3D virtual tour
Data	Administrative data

Contribution to public service continuity	As part of the measures taken against the COVID-19 pandemic, museums and archaeological sites had to be closed. In this process, the Ministry of Culture and Tourism has benefited from today's technological opportunities in order not to leave the interest of the society in cultural heritage unrequited and to contribute to the promotion of museums and archaeological sites. 32 museums and archaeological sites and 1 temporary exhibition provided a virtual tour experience that can be visited interactively over the internet.
Main sources	https://sanalmuze.gov.tr/ kulturvarlikmuze@kultur.gov.tr

Table 53. Turkey - Presenting and Reporting Entrepreneur Information System Data

Country	Republic of Turkey
Initiative	Presenting and Reporting Entrepreneur Information System Data
Service	Public Services
Information	EIS (Entrepreneur Information System) is an enterprise-based information system in which data consisting of administrative records of eight different institutions is integrated. Economic activity data of enterprises that generate commercial income in the Turkish economy; is aggregated in a central database using key variables of Tax Identity Number and TR Identity Number. In the EIS system, a wide variety of reports and tables, along with macro data, supported business intelligence software, serve the employees of the Ministry of Industry and Technology. In addition, productivity statistics are presented in a flexible and fast way for the benefit of public institutions and organizations.
Digital tool	Business Intelligence
Data	• Balance, financial statements and Income Data of Institutions and Companies • Number of Employees, gender and age group • Foreign Trade Data • Patent, utility model, industrial design and trademark application information • • Support and loans are given to businesses
Contribution to public service continuity	The number of people using this business intelligence interface software is increasing every year.
Main sources	• gbs.sanayi.gov.tr (It works in internal network) • gbs.sanayi.gov.tr/verimlilik

Table .54. Turkey - Technology Focused Industrial Movement Program

Country	Republic of Turkey
Initiative	*Teknoloji Odakli Sanayi Hamlesi Programi* (Technology Focused Industrial Movement Program)
Service	Public services
Information	This mechanism is targeted towards investments aiming to produce high-value-added products in high technology or medium-high technology sectors.
Digital tool	Web based application interface
Data	Project application data of firms including financial data and data about investment project activities.
Contribution to public service continuity	The application serves to promote high-value added private investments.
Main sources	www.hamle.gov.tr

Table .55. Turkey - National Productivity Statistics

Country	Republic of Turkey
Initiative	National Productivity Statistics
Service	Public services

Information	The aim of this program is to produce labor productivity statistics within the scope of economic activity classes throughout the country.
Digital tool	MS office programs, Power BI
Data	Official statistical data produced by the TurkStat
Contribution to public service continuity	It is important for researchers and academics working on productivity as a reliable and continuous data set. It also plays a role as a decision support mechanism for senior policy makers.
Main sources	GBS - Productivity Statistics (sanayi.gov.tr)

Table 56. Turkey - Electronic Investment Incentive Certificate

Country	Republic of Turkey
Initiative	Electronic Investment Incentive Certificate
Service	Public Services, Investment Incentive Certificates
Information	In 2018 “Electronic Incentive Application and Foreign Direct Investment System” (ETUYS with its abbreviation in Turkish) is launched to take and assess investment incentive applications in the digital medium. Since then all the investment incentive applications have been taken and incentive certificates have been granted in an electronic medium. On average, an investment is completed in about three years. During this investment period all the applications like revisions of the machinery and equipment lists, providing machines by leasing, changing investment place, registering invoices and import documents etc. are made through ETUYS. The provided support measures have to be followed by other public institutions like the Ministry of Finance and the Ministry of Trade. When a certificate is issued its characteristic data is sent to these institutions through web service, so during procurement of machines investors complete the processes without submitting any document. The system has interfaces for banks and leasing companies. The credit or leasing applications of the investors are verified and completed through these interfaces. To benefit from measures like VAT Exemption, Social Security Premium Support and Interest/Profit Share Support the invoices and other documents are also uploaded through ETUYS. ETUYS has simplified the application process by eliminating the submission of document as hard copies and hastened the application evaluation time. When additional information or documents are required to complete the evaluation, a request is sent to the investors through the system and in most cases, they are obtained immediately. ETUYS especially proved itself as a very useful system during the global pandemic. During lockdown all investors had the opportunity to apply electronically through ETUYS.
Digital tool	Web based application
Data	Administrative data
Contribution to public service continuity	Electronic Incentive Application and Foreign Direct Investment System hastened the process of granting an incentive certificate and eliminated hard copy documents. It also reduced the bureaucratic procedures in other institutions and providing real-time data to all the parties involved in the investment phase made the transactions easy.
Main sources	https://etuys.sanayi.gov.tr/ebelge/Giris.jsp;https://www.sanayi.gov.tr/destek-ve-tesvikler/yatirim-tesvik-sistemleri

Table 57. Turkey - Conducting Market Surveillance Activities electronically via the tablet system

Country	Republic of Turkey

Initiative	Conducting Market Surveillance Activities electronically via the tablet system
Service	Public service
Information	In applications before 2020, market surveillance data (product identification data, economic operator information, test results, information on measures taken by surveillance authority etc.) were first processed into the paper forms and then into the database. This situation caused a waste of time, also caused an extra workload on inspectors. Also, printing the paper fo every year caused an additional cost. With the market surveillance tablet project, which started to be implemented in 2020, tablets were distributed to inspectors in the provinces and the inspectors were recorded electronically. This system also ensures that reports are received instantly. In the reports the product name, brands and models, the number of safe, non-compliance and unsafe products, the number of corrective actions, the number of products sent for testing, and the number of administrative fines are obtained. Besides, different options can be added to these basic criteria depending on the type of report received.
Digital tool	Mobile Technology
Data	Product identification data (product name, brand and model), economic operator information (company name, company address), test information and test results, information on measures taken by surveillance authority, recall information, market surveillance import information and administrative fine information
Contribution to public service continuity	All inspection data are monitored and reported quickly and instantly. Duplication is prevented in market surveillance activities. The pace of market surveillance activities is increasing as costs are reduced. The effectiveness of market surveillance activities is increasing.
Main sources	pgd.sanayi.gov.tr

Table 58. Turkey - Safir Depo Cloud Storage Software

Country	Republic of Turkey
Initiative	Safir Depo Cloud Storage Software
Service	General Public Services and Operations, Productivity
Information	Safir Depo is a cloud computing-based, secure cloud storage software. Safir Depo can either be used as a cloud service (SaaS) or as an on-premise installation to any institution's data centre. Users of the software can access their documents from anywhere and anytime they need. For increased security, Safir Depo provides an additional security layer for an end-to-end encryption solution. This feature provides the opportunity of storing organizations' internal documents securely and the ability to access these files by the remote workers of the public organization. Therefore Safir Depo provides an uninterrupted working experience to the public organizations in circumstances like the COVID-19 pandemic.
Digital tool	Cloud technologies, Software-as-a-Service (SaaS)
Data	Administrative Data, Organizational Data
Contribution to public service continuity	During the COVID-19 pandemic, several counter-measures were deployed including working shifts and remote working. These counter-measures surely affected public services and operations negatively as not every public institution has access to internal documents from outside their private network. By providing a secure and self-hosted solution to store internal documents and access to these documents from any location, the Safir Depo project eliminates the downsides of remote working.
Main sources	https://safirdepo.b3lab.org/

Table .59. Turkey - COVID-19 Detection from Computed Tomography Images

Country	Republic of Turkey
Initiative	COVID-19 Detection from Computed Tomography Images
Service	Public Services
Information	To assist physicians in the diagnosis of COVID-19, an artificial intelligence application has been developed that diagnoses COVID-19 from Computed Tomography (CT) images. With this study, CT images are classified in a short time and give an idea to the physician within the scope of COVID-19 diagnosis. In addition to the

	classified disease, the volume occupied by the involvement in the lung is shown as a percentage and a heat map is created. In this context, Pneumonia, COVID-19 positive and COVID-19 negative statuses are determined according to the CT image of the patient. To increase the success of the model and to carry out test studies, the studies regarding the process continue with the data instantly transferred to our Ministry from Ankara City Hospital and Adana City Hospital.
Digital tool	AI
Data	Health Data
Contribution to public service continuity	Studies on the application are ongoing, and when the integration of the application with the health institutions is completed, physicians will save time spend analyzing test results. Every second gained will save and prolong the lives of many people.
Main sources	

Table 60. Turkey - Marking Lesions and Calcified Areas on Mammography

Country	Republic of Turkey
Initiative	Marking Lesions and Calcified Areas on Mammography Images
Service	Public Services
Information	Mammography CAD application has been developed in order to detect lesions and calcified areas in mammography images with the help of artificial intelligence. In this context, calcified areas and lesions in Digital MLO and CC mammography images are marked by the system. Thanks to the integration with the Telemedicine Viewer prepared for physicians, radiologists can operate the artificial intelligence algorithm within the scope of the image via a button, and as a result, they can see the areas marked as lesion or calcified area. The system is currently in the testing phase. After the tests, it will be disseminated in a way that radiologists in the field can use.
Digital tool	AI
Data	Health Data
Contribution to public service continuity	Studies on the application are ongoing, and when the integration of the developed application with the health institutions in our country is completed, physicians will save the time they spend to analyze the test results, and thus they will be able to spare more time for the patient. Every second gained will save and prolong the lives of many people.
Main sources	

Table 61. Turkey - e-Triage- What is wrong with me System

Country	Republic of Turkey
Initiative	e-Triage- What is wrong with me System
Service	Public Services
Information	The e-Triage platform use Machine Learning (ML), to ask patients questions about his/her illness before the appointment screen and present clinic information to the patient according to the answers given.
Digital tool	AI / ML
Data	Health Data
Contribution to public service continuity	It is to provide more effective and qualified service by proposing the appropriate polyclinic according to the complaints of the citizens, to enable the citizens to access the health service faster with the right guidance, thus to save cost and time, and to prevent physicians from wasting time with patients who are not in their field of expertise.
Main sources	neyimvar.gov.tr

Table 62. Turkey - National Solution for Detection of Brain Anomalies: "Turkish Brain Project"

Country	Republic of Turkey
Initiative	National Solution for Detection of Brain Anomalies: "Turkish Brain Project"
Service	Social services: Healthcare
Information	Within the scope of the "Turkish Brain Project", which started with the cooperation of the Presidency of the Republic of Turkey Digital Transformation Office, Gazi University Hospital, and Gazi University Engineering Faculty, the first application was implemented in Gazi University Hospital. Various anomalies can be detected

	on MR images using AI models developed using the infrastructure of the Presidency Digital Transformation Office.
Digital tool	AI
Data	Brain MRI images
Contribution to public service continuity	Expanding the developed AI-empowered system to make it available to hospitals throughout the countryThe AI-empowered system has reached the capacity to recognize different brain anomalies, According to the results of the system, it is aimed to realize different early diagnosis systems.
Main sources	

Table 63. Turkey - Breast Cancer Detection using AI

Country	Republic of Turkey
Initiative	Breast Cancer Detection using AI
Service	Social services: Healthcare
Information	The most effective screening method for the early detection of breast cancer is mammography. Diagnosing cancer at an early stage reduces the rates of mastectomy (removal of breast tissue as a treatment in patients diagnosed with breast cancer or at high risk of breast cancer), reduces the long-term side effects of combined treatments, shortens the healing process, and increases survival rates. The purpose of this project is to minimize the mistakes made especially in mammography scans and to ensure that the images detected as risky by AI are prioritized for our radiologists to review. Thus, it is aimed to be used as a decision support system in the busy work processes of our radiologists and to increase the possibility of saving lives with early diagnosis. By using the labelling tool developed by the Digital Transformation Office, benign and malignant anomalies in the mammography images are labelled by the radiologist. AI model development processes have been completed with open-source datasets, and the work continues by increasing the success rates with labelled data.
Digital tool	AI
Data	Open-sourced mammography images
Contribution to public service continuity	It is aimed to increase the efficiency and accuracy of scanning mammography images of radiologists. AI modelling can be considered as a new 'Eye' in image scanning, and it is intended to be used as a Decision Support System to eliminate negative situations caused by human errors in radiologists' image scanning.
Main sources	

Table .64. Turkey - Integrated Public Financial Management Information System Project

Country	Republic of Turkey
Initiative	Integrated Public Financial Management Information System Project
Service	Public service
Information	A number of technological developments were made with the Integrated Public Financial Management Information System Project, which was implemented within the scope of the digitalization of public services. Payment, collection, asset and accounting transactions of public administrations within the scope of the central government have started to be carried out more efficiently in the electronic environment. In this context, some collection transactions, especially on behalf of the public, were transferred to the electronic environment. Thus, it was ensured that citizens and institutions benefit from the service. This situation has positively affected the health of citizens by carrying out transactions in the electronic environment during the Covid-19 pandemic. The following activities were carried out within the scope of digitalization of collection processes. In June 2018, “e-collection” started to be fully implemented within the scope of zoning amnesty. Thus, payments can be made via internet banking and mobile banking. On 01/06/2020, the POS device and GUMKART Application, which were physically used by the accounting units and some trustees, were terminated. The collections made here were included in Internet Banking and mobile banking services as a result of the protocol signed with 6 public banks.

	Virtual POS was put into practice on 05/08/2020 in order to reduce the crowds at the border gates regarding the collection of Administrative Fines imposed on vehicles with foreign license plates and considering the Covid-19 Outbreak.
Digital tool	e-collection, virtual POS, use of internet and mobile banking
Data	Different collection information from different public administrations
Contribution to public service continuity	It will be ensured that public services are provided in a healthier and higher quality manner in the digital environment. In addition, both citizens and public administrations were given the opportunity to carry out financial transactions in the digital environment. In this context, public services will be carried out more reliably, more effectively and quickly.
Main sources	

Table .65. Turkey - Detection of Liver Lesions using AI

Country	Republic of Turkey
Initiative	Detection of Liver Lesions using AI
Service	Social services: Healthcare
Information	Detection of benign and malignant lesions of the liver by Computed Tomography imaging methods, to determine the possible uses and effectiveness of AI applications in diagnosis, Transferring the data obtained by the software teams to computer systems for AI applications by determining whether the liver lesions are hypo-dense or hyper-dense, measured HU (Hounsfield Unit) and contrast enhancement properties, which are retrospectively diagnosed in liver CT examination, It is aimed to detect early-stage disease by using algorithms and computer technologies, to develop early disease diagnosis predictions with big data analytics, to detect diseases, tumors, anomalies, and similar conditions from liver CT images.
Digital tool	AI
Data	Open-source CT images
Contribution to public service continuity	It could be used to make a robust and early diagnosis
Main sources	

Table .66. Turkey - Detection of Viral Myocarditis Related to COVID-19 and Non-COVID-19 using AI

Country	Republic of Turkey
Initiative	Detection of Viral Myocarditis Related to COVID-19 and Non-COVID-19 using AI
Service	Social services: Healthcare
Information	Based on current studies, it is believed that AI applications will be used more effectively and widely in the field of radiology soon. In this way, it can be possible to diagnose existing pathologies more effectively and in a shorter time. In line with these developments and expectations, our study aimed to detect COVID-19-related and non-COVID-19 viral myocarditis with cardiac MRI and to determine the possible uses and effectiveness of AI applications in diagnosis. In a retrospective study, AI models will be developed with the data obtained by determining features such as image signals and contrast enhancement in the MRIs of patients diagnosed with myocarditis in cardiac MRI.
Digital tool	AI
Data	MRI images
Contribution to public service continuity	There is information that the COVID-19 virus causes damage to the heart muscle and causes myocarditis (heart muscle inflammation). It is aimed to assist the radiologist as a decision support system in the rapid diagnosis of the number of cases diagnosed with myocarditis due to COVID-19 due to the COVID-19 pandemic.
Main sources	

Table .67. Turkey – Education Information Network

Country	Republic of Turkey
Initiative	Education Information Network
Service	Public Online Educational Platform Service

Information	EBA is a distance education platform prepared by the Ministry of National Education within the scope of the F.A.T.I.H. Project, and which has been recently renewed and adapted to distance education during COVID-19. Through EBA, teachers and students can interact with each other, teachers can send study materials to their students, and they can monitor their students' performances on study materials and general EBA usage. Students can track their progress via reports and portfolios. Parents can also track their children's progress via reports and portfolios. In addition to providing customized interface and content for each student with personalization, the system recommends content according to the performance of the students' thanks to the smart suggestion system. In EBA, the contents are being matched with the relevant curriculum objectives. Other contents that not matched the curriculum objectives are included in the Library area for free use and supportive course content. When teachers send study material to their students via EBA, the students' work is analyzed in detail by the system and the deficiencies of each student are determined separately based on objectives. Taking this analysis into account, the system determines the content that can help each student to remedy his/her deficiencies and recommends them to the student if the teacher approves. In addition, without teacher intervention, there is also a special content recommendation system that recommends additional content based on questions a student solves while using EBA and the answers he/she provides in the exams. EBA has an "Academic Support Module" as well for 11th and 12th-grade students to help them be prepared for the national university entrance exams. In this module, there are detailed lecture videos, sample questions and solution videos, tests, university entrance exam questions and solutions from previous years. The module uses a special algorithm that plans how much students should study on which subject, taking into account his/her university preference list and his/her current achievement level. Thus, students are provided with the opportunity to work with a personalized roadmap according to their goals. Here, first of all, students have to choose the universities and departments they target in the module and solve the tests in the system to determine their readiness level. The system determines which subject should be comprehended with what depth following the students' readiness level and goals. In addition, special content suggestions are offered so that the student can only cover his/her weaker achievement areas. To achieve this; the time intervals (in seconds) of all the questions and lecture videos used in the module system were added to the system by labelling them with the objectives. The proficiency levels in the objectives are evaluated over all the questions solved by the students, and the lecture video fragments and sample questions related to the objectives below a certain level are presented as a student-specific worklist. This list considers the hierarchical order of content in the curriculum (content that must be presented first according to the curriculum is also first in the list).
Digital tool	AI/ML - Personalized Content Recommendation Algorithms
Data	Guiding Data for School Principals, Teachers, Students, and Parents
Contribution to public service continuity	EBA has played an essential role in supporting face-to-face schooling in general and has been serving as the main learning platform for distance education in Turkey during the COVID-19 period. With 14 Billion 776 Million clicks, EBA became the 1st most visited educational site in the world in 2020. As for 18.06.2021: • EBA Mobile application has reached 31 million downloads for Android devices and 3.1 million downloads for iOS devices. • 14.111.941 students and 1.177.725 teachers actively used EBA, 1.917.365 students and 267.942 teachers actively used EBA Academic Support Module. • EBA, which continued to be used relatively less intensively in distance education during the periods when schools were open, reached 23.769.308.322 clicks and was among the top 5 in the education category in the world.
Main sources	www.eba.gov.tr http://fatihprojesi.meb.gov.tr/en/

United Kingdom

Table 68. United Kingdom - GOV.UK Notify

Country	United Kingdom
Initiative	Government as a Platform
Service	GOV.UK Notify
Description	The Government Digital Service is the central digital agency in the UK and delivers platforms, products and services that help government to become joined-up, trusted and responsive to user needs GOV.UK Notify is one of the Government as a Platform products that allows organisations in the public sector to send emails, texts and letters to their users. GOV.UK Notify can either be integrated as part of a service using APIs or can be used by those with no technical expertise from an online interface. There's a real-time reporting dashboard to see the delivery status of messages being sent. It is operated by a small multidisciplinary team, is open source and the code is available on the alphagov repository: https://github.com/alphagov There is also no contract, no monthly charge, no setup fee and no procurement fee.
Digital tool	Platform
Data	Administrative data
Contribution to public service continuity	The service was used to help organisations across the public sector spin up services to keep in touch with their users. For example, the service has been used for NHS text message support for the extremely vulnerable and those isolating at home, business continuity messaging for public sector staff, and FCDO travel alerts for those overseas. To put the increase in usage into perspective, around 2 million SMS messages were sent using GOV.UK Notify on a single day in March, compared to a daily average of 150,000. Daily messages across all channels (SMS, email, and letter) have been up by as much as 600% – as high as 8.6 million per day. Having a platform like GOV.UK Notify where services can get going in hours not weeks or months, has enabled critical messages to be delivered when people are in real need. Notify has formed the basis of similar tools produced by other leading digital nations, with Australia's Digital Transformation Agency and the Canadian Digital Service utilising Notify's open source code to build a similar version of the tool, which was used to share government messaging across both countries throughout the pandemic.
Main sources	https://www.notifications.service.gov.uk/ https://www.notifications.service.gov.uk/documentation https://gds.blog.gov.uk/2020/05/13/how-government-as-a-platform-is-helping-in-the-COVID-19-response/ https://gds.blog.gov.uk/2020/04/03/how-gov-uk-notify-reliably-sends-text-messages-to-users/ https://digital.canada.ca/2019/11/26/introducing-notify/

Table 69. United Kingdom - GOV.UK Pay

Country	United Kingdom
Initiative	Government as a Platform

Service	GOV.UK Pay
Description	The Government Digital Service is the central digital agency in the UK and delivers platforms, products and services that help government to become joined-up, trusted and responsive to user needs GOV.UK Pay is one of the Government as a Platform products that allows organisations in the public sector to accept card payments and provide refunds. As Pay is free to use, central government teams should be able to avoid lengthy procurement processes. Pay can integrate as part of a service or set up an independent page if the service normally collects payment through paper or email. A service team can set up a page and take payments within a day. There is a real time dashboard to track payments. It is operated by a small multidisciplinary team, is open source and the code is available on the alphagov repository: https://github.com/alphagov
Digital tool	Platform
Data	Payments data
Contribution to public service continuity	Some services need to stop taking cheques or reduce reliance on call centres, as offices closed and call centres had fewer staff. GOV.UK Pay was able to help these services start taking payments within a day and keep important services running. For example, the Home Office has added GOV.UK Pay's standalone payment links to invoices to support payments typically taken over the phone by staff at the Shared Service Centre. Normally these payments are taken using hand held terminals, which required staff to physically be onsite to deliver the service. GOV.UK Pay's payment links can be set up in minutes and require no technical integration. They are hosted on GOV.UK so users know they can trust them, and tell the user what they are paying for. The Home Office team have added the payment link to email replies, enabling customers to pay online for invoices for the first time. Some local authorities have set up services on GOV.UK Pay the same day in order to securely take donations for crisis funds and food banks to support their communities. The GOV.UK Pay platform is free to use, and services aren't locked into a contract, making it useful when there is a lot of time pressure.
Main sources	https://www.payments.service.gov.uk/ https://www.payments.service.gov.uk/using-govuk-pay/ https://gds.blog.gov.uk/2020/05/13/how-government-as-a-platform-is-helping-in-the-COVID-19-response/

Table 70. United Kingdom - GOV.UK Platform as a Service

Country	United Kingdom
Initiative	Government as a Platform
Service	GOV.UK Platform as a Service
Description	The Government Digital Service is the central digital agency in the UK and delivers platforms, products and services that help government to become joined-up, trusted and responsive to user needs GOV.UK PaaS is one of the Government as a Platform products that allows organisations in the public sector to host services in the cloud. It is built to meet the National Cyber Security Centre (NCSC) Cloud Security Principles. Organisations are not tied into a contract and can leave at any point. They only pay for the resources they use (e.g. compute, memory and database storage).

	It is operated by a small multidisciplinary team, is open source and the code is available on the GitHub alphagov: https://github.com/alphagov?q=paas
Digital tool	Platform
Data	Administrative data
Contribution to public service continuity	GOV.UK PaaS was used by multiple departments to spin up services quickly at the outset of the COVID-19 pandemic, such as the Clinically Vulnerable People Service and the Business volunteer form which was set up and deployed to GOV.UK PaaS within four days, and give extra capacity to enable GOV.UK Notify to scale to meet increased demands. It was also used to host dashboards for the Prime Minister's Office and other information sharing services within government during the pandemic. Since the start of COVID19 in March 2020, there were 70 new accounts created on GOV.UK PaaS compared to 42 for the same period the year before (an increase of 66%).
Main sources	https://www.cloud.service.gov.uk/ https://www.cloud.service.gov.uk/features/ https://gds.blog.gov.uk/2020/05/13/how-government-as-a-platform-is-helping-in-the-COVID-19-response/

Table .71. United Kingdom - GOV.UK Design System

Country	United Kingdom
Initiative	Design System
Service	GOV.UK Design System
Description	The Government Digital Service is the central digital agency in the UK and delivers platforms, products and services that help government to become joined-up, trusted and responsive to user needs The GOV.UK Design system allows teams to build their services using components and patterns that comply with the service standard but are all tested for accessibility (to meet the public sector accessibility laws) New components are added and discussed by a cross-government working group and added to the system by GDS. It is operated by a small multidisciplinary team, is open source and the code is available on the alphagov repository: https://github.com/alphagov
Digital tool	Platform
Data	Administrative data
Contribution to public service continuity	The Design System was used by many service teams during COVID-19, including the GOV.UK team designing the COVID-19 landing page and an emergency driving test service from Driver and Vehicle Standards Agency (DVSA). It allowed teams to use components, patterns and styles that were Web Content Accessibility Guidelines (WCAG) compliant, so they could focus on delivering the service and not have to worry about the frontend. This saved teams money but most crucially, reduced the time to deliver services to their users. This tool also allowed for increased consistency across government messaging, content and services throughout the pandemic. This made it clear to users when content and information was reliably from government, helping to combat the spread of misinformation.
Main sources	https://design-system.service.gov.uk/ https://designnotes.blog.gov.uk/2020/06/08/designing-the-gov-uk-coronavirus-page/

	https://designnotes.blog.gov.uk/2021/04/29/designing-at-pace-at-the-driver-and-vehicle-standards-agency-dvsa/

Table .72. United Kingdom - GOV.UK Coronavirus landing page

Country	United Kingdom
Initiative	GOV.UK
Service	GOV.UK Coronavirus landing page
Description	The Government Digital Service is the central digital agency in the UK and delivers platforms, products and services that help government to become joined-up, trusted and responsive to user needs GOV.UK is the single domain for government, which hosts all government services and information. It is operated by multidisciplinary teams, is open source and the code is available on the alphagov repository: https://github.com/alphagov. There is no cost for departments to use GOV.UK. The GOV.UK coronavirus page, gov.uk/coronavirus, is the definitive source of government guidance and support related to COVID-19. Government information is split into clear categories like health and wellbeing, or housing and accommodation. A multidisciplinary team designed, built, and shipped the page in under 5 days. Since going live on 20 March, the page has received tens of millions of views and helped people find the answers to important questions.
Digital tool	Platform
Data	Administrative data
Contribution to public service continuity	GOV.UK used its existing architecture to ensure that information was available to the public, but in an easily accessible way. There was existing functionality on GOV.UK to aggregate information, but this was rebuilt during the early stages of the pandemic. It was the single place where people in the UK could find out everything from services that were available to them (such as the Clinically Vulnerable People Service) to the latest social distancing rules. The coronavirus landing page is designed for mobile first, with the desktop view as an alternative. The majority of the traffic to GOV.UK is from mobile devices. In February 2020, 62.03% of users accessed GOV.UK through mobile and in March 2020 this increased to 70.63%. In the first 24 hours of going live, there were more than 750,000 views of the page. And on 24 March there was a peak of 9.2 million views, a record for the biggest spike in GOV.UK traffic and more than double the previous record set in November 2019 on the deadline to register to vote in the last general election. In its first month (20 March to 20 April 2020) there were at least 26.4 million page views of the page. GOV.UK analytics only count users who accept cookies that measure website use, so the true figures would be even higher.
Main sources	https://www.gov.uk/ https://designnotes.blog.gov.uk/2020/06/08/designing-the-gov-uk-coronavirus-page/

Annex D. G20 AI Principles

The G20 supports the Principles for responsible stewardship of Trustworthy AI in Section 1 and takes note of the Recommendations in Section 2.

Section 1: Principles for responsible stewardship of trustworthy AI

1.1. Inclusive growth, sustainable development and well-being

Stakeholders should proactively engage in responsible stewardship of trustworthy AI in pursuit of beneficial outcomes for people and the planet, such as augmenting human capabilities and enhancing creativity, advancing inclusion of underrepresented populations, reducing economic, social, gender and other inequalities, and protecting natural environments, thus invigorating inclusive growth, sustainable development and well-being.

1.2. Human-centred values and fairness

a) AI actors should respect the rule of law, human rights and democratic values, throughout the AI system lifecycle. These include freedom, dignity and autonomy, privacy and data protection, non-discrimination and equality, diversity, fairness, social justice, and internationally recognized labour rights.

b) To this end, AI actors should implement mechanisms and safeguards, such as capacity for human determination, that are appropriate to the context and consistent with the state of art.

1.3. Transparency and explainability

AI Actors should commit to transparency and responsible disclosure regarding AI systems. To this end, they should provide meaningful information, appropriate to the context, and consistent with the state of art:

i. to foster a general understanding of AI systems;

ii. to make stakeholders aware of their interactions with AI systems, including in the workplace;

iii. to enable those affected by an AI system to understand the outcome; and,

iv. to enable those adversely affected by an AI system to challenge its outcome based on plain and easy to-understand information on the factors, and the logic that served as the basis for the prediction, recommendation or decision.

1.4. Robustness, security and safety

a) AI systems should be robust, secure and safe throughout their entire lifecycle so that, in conditions of normal use, foreseeable use or misuse, or other adverse conditions, they function appropriately and do not pose unreasonable safety risk.

b) To this end, AI actors should ensure traceability, including in relation to datasets, processes and decisions made during the AI system lifecycle, to enable analysis of the AI system's outcomes and responses to inquiry, appropriate to the context and consistent with the state of art.

c) AI actors should, based on their roles, the context, and their ability to act, apply a systematic risk management approach to each phase of the AI system lifecycle on a continuous basis to address risks related to AI systems, including privacy, digital security, safety and bias.

1.5. Accountability

AI actors should be accountable for the proper functioning of AI systems and for the respect of the above principles, based on their roles, the context, and consistent with the state of art.

Section 2: National policies and international co-operation for trustworthy AI

2.1. Investing in AI research and development

a) Governments should consider long-term public investment, and encourage private investment, in research and development, including inter-disciplinary efforts, to spur innovation in trustworthy AI that focus on challenging technical issues and on AI-related social, legal and ethical implications and policy issues.

b) Governments should also consider public investment and encourage private investment in open datasets that are representative and respect privacy and data protection to support an environment for AI research and development that is free of inappropriate bias and to improve interoperability and use of standards.

2.2. Fostering a digital ecosystem for AI

Governments should foster the development of, and access to, a digital ecosystem for trustworthy AI. Such an ecosystem includes in particular digital technologies and infrastructure, and mechanisms for sharing AI knowledge, as appropriate. In this regard, governments should consider promoting mechanisms, such as data trusts, to support the safe, fair, legal and ethical sharing of data.

2.3 Shaping an enabling policy environment for AI

a) Governments should promote a policy environment that supports an agile transition from the research and development stage to the deployment and operation stage for trustworthy AI systems. To this effect, they should consider using experimentation to provide a controlled environment in which AI systems can be tested, and scaled-up, as appropriate.

b) Governments should review and adapt, as appropriate, their policy and regulatory frameworks and assessment mechanisms as they apply to AI systems to encourage innovation and competition for trustworthy AI.

2.4. Building human capacity and preparing for labour market transformation

a) Governments should work closely with stakeholders to prepare for the transformation of the world of work and of society. They should empower people to effectively use and interact with AI systems across the breadth of applications, including by equipping them with the necessary skills.

b) Governments should take steps, including through social dialogue, to ensure a fair transition for workers as AI is deployed, such as through training programs along the working life, support for those affected by displacement, and access to new opportunities in the labour market.

c) Governments should also work closely with stakeholders to promote the responsible use of AI at work, to enhance the safety of workers and the quality of jobs, to foster entrepreneurship and productivity, and aim to ensure that the benefits from AI are broadly and fairly shared.

2.5. International co-operation for trustworthy AI

a) Governments, including developing countries and with stakeholders, should actively cooperate to advance these principles and to progress on responsible stewardship of trustworthy AI.

b) Governments should work together in the OECD and other global and regional fora to foster the sharing of AI knowledge, as appropriate. They should encourage international, cross-sectoral and open multi-stakeholder practices to garner long-term expertise on AI.

c) Governments should promote the development of multi-stakeholder, consensus-driven global technical standards for interoperable and trustworthy AI.

d) Governments should also encourage the development, and their own use, of internationally comparable metrics to measure AI research, development and deployment, and gather the evidence base to assess progress in the implementation of these principles.