BRIEF VERSION OF THE REPORT
ARTIFICIAL INTELLIGENCE
AND DIGITAL TRANSFORMATION

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ABSTRACT

Digital transformations are continuously changing how people live, work and function in their societies. These applications of technology can be noticed in education, trans-portation, data storage, communications and healthcare, among other fields. The development and use of digital technologies is also impacting how governments operate and function. Digital transformation, including artificial intelligence (AI) adoption, has become one of the highest priorities for public organisations. For instance, governments are increasingly trying to digitize their services through technology because of growing public expectations. But today, some governments are asked to do more: to create an enabling environment in which green, inclusive, equitable digital transformation strengthens democratic societies and economies. Several studies have indeed revealed critical digital competencies gaps in the public sector, including in the Global South. It is therefore extremely important to identify and address those digital transformation gaps and to succeed in the public sector, as a catalyst of change for societies and economies in digital age. While there is a growing literature on the types of digital competencies that public sector officials need, there is an unmet need to develop comprehensive digital competency frameworks that can: clearly identify the internal challenges a government faces in its digital transformation journey; propose specific competencies that can address those challenges, and: take into account some specificities of the Global South. The AI and Digital Transformation Competency Framework unpacks the major AI and digital transformation competencies needed in the public sector. The framework aims to provide guidance not just for civil servants, but for inter-national organisations and regional and national actors to support capacity development. Each Competency Domain is structured around three Proficiency Levels: Basic, Medium and Advanced, and includes an 'AI-specific level' that aims to identify and unpack the major AI elements.

KEYWORDS: Artificial intelligence, digital transformation, communications.

INTRODUCTION

Digital transformation, including artificial intelligence (AI) adoption, has in recent years become a mantra for public organisations; governments are increasingly digitizing their services using technology to better understand and respond to the needs of the public. For digital transformation to succeed, governments need to change the way they function, take a whole-of-society, inclusive approach – their governance models, structures and organisations need to adapt to the new challenges and opportunities posed by the development and use of digital technologies. At the same time, governments face new and complex challenges that are difficult to diagnose and predict, which puts additional pressure on the public sector.

Research shows that there are important gaps in digital competencies within governments and that these gaps appear to be wider in the Global South. It is argued that, in many cases, failures of digital transformation projects are due not only to a lack of IT infrastructure and appropriate policy framework, but also to a lack of appropriate digital competencies within government and the difficulty of applying those competencies effectively. As a result, governments worldwide are paying attention to the types of competencies instead of knowledge, skills and attitudes that civil servants need to effectively use digital tools, develop and implement digital transformation projects, and address complex governance challenges.

I. DIGITAL COMPETENCIES IN GOVERNMENT

As an entry point for digital capacity building, many governments, international organisations, think tanks and universities have developed competency frameworks, courses, and syllabi that aim to provide the foundations for training public sector officials on digital transformation.

The competency framework was developed through analysis of the commonalities identified in those frameworks analyzed for this report, and digital-transformation syllabi already developed by training institutions and universities, and an analysis of some of the gaps in these frameworks when mapped to the competencies needed for digital transformation and digital governance initiatives as identified through stakeholder consultations, cases studies and interviews.

For instance, Figure 1 shows different areas where civil servants, rather than becoming technology specialists, need to understand the impact of some of these technologies on society and address them through different policy tools.

The competency framework is structured as follows:

Digital Planning and Design. This competency domain enables civil servants to understand the complexity of today's problems, anticipate unexpected events, and recognize strategic opportunities to use digital solutiowns and develop strategies and vision.

Figure 1. Civil servants need to understand the impact of technologies – not to become specialists

Data Use and Governance. This competency domain enables civil servants to understand the fundamental role and value of data, as well as the inherent risks, and the ability to use, analyze and share data, taking into consideration ethical, privacy and security concerns. This domain is fundamental for civil servants to be able to address governance challenges and meet the public's growing expectations, while at the same time use data effectively and responsibly.

Digital Management and Execution. This competency domain enables civil servants to understand innovative projectmanagement and collaboration practices. It involves the application of a new set of working methods, approaches and tools to use data and technology to address complex problems, and to foster new modalities for civic participation in digital transformation and digital governance.

Each competency domain is divided into a set of skills with three levels of proficiency:

Basic – Broad understanding and knowledge of a subject and theme and the ability to carry out certain basic tasks related to the subject.

Intermediate – Good understanding of a subject and theme and the ability to carry out more advanced tasks related to the subject. Capability to deal with and provide guidance to others on different tasks related to the subject.

Advanced – Advanced understanding and knowledge of a subject and theme. Demonstration of applied approaches, tools and methods related to the subject and ability to coach other people. Also, the ability to embed the specific skill and related practices across the organisation and to coach others to do so.

The AI and digital transformation competency framework shows on Figure 2.

Three domains in which civil for digital governance initiatives:
– digital planning;
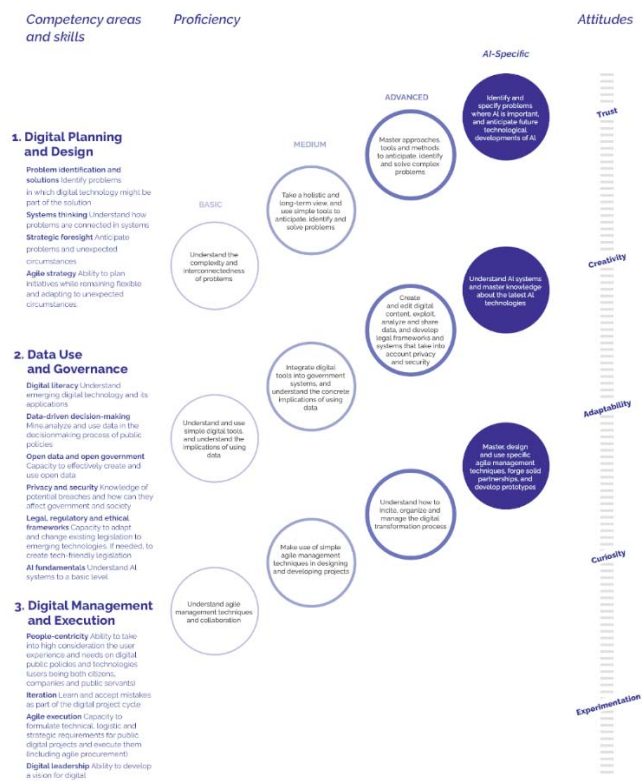– data use;
– digital management.

Figure 2. The AI and digital transformation competency framework

Digital Planning and Design enables civil servants to understand the complexity of today's problems, anticipate unexpected events and recognize strategic opportunities to use digital solutions and develop strategies and vision.

The complexity and interconnected nature of problems (including the use of technology) facing governments requires civil servants to understand and approach challenges through the lens of systems thinking; complex problems are nonlinear. Public administration systems based on a command-and-control model have proven to function well in stable systems with linear cause and-effect relationships; however, they do not work well when dealing with complex problems and emerging technologies. A systems-thinking approach is needed in the public sector as governmental work impacts a wide range of stakeholders differently.

Systems thinking is about:
• understanding and being aware of the complexity of problems;
• understanding the level of interconnectedness of problems and solutions; solving one problem within a system will influence other elements as well.

Good practices in developing projects, programs and policies require civil servants to understand a problem before developing solutions. This is key for identifying entry points for specific problems and appropriate solutions.

Problem identification and solutions is about:

• understanding the problem in depth and being able to know and use tools and approaches for identifying the root cause of the problem by using simple tools (e.g., problem trees) incorporating the perspective of the user and the people with lived experience of the problem (i.e., through ethnographic research techniques);
• pplying critical thinking to solve a problem;
• deciding on courses of action and implementing the solutions developed to overcome a problem and constraints.

This competency is strongly related to people-centricity and iteration, as it should enable civil servants to understand a problem by interacting with beneficiaries to develop solutions that are tailored to suit their needs. It is also related to creativity.

The problems civil servants face are complex, of unclear nature, and impact many stakeholders. Strategic foresight helps to anticipate and address rapid change and uncertainty, supports innovation by revealing options for experimentation, and helps in futureproofing by stress-testing existing or proposed strategies. In particular, technological improvements change today's landscape continuously – strategic foresight is particularly important as a way of: understanding how technological trends can impact societies, and developing projects or policies as anticipated in response to them.

Strategic foresight is about:
• developing 'big-picture thinking';
• spotting patterns and trends to understand the strategic drivers of digital transformation and informing decision-making based on them.

This competency relates to trust. For governments hoping to foster a culture of foresight, there needs to be a shift towards learning capture and knowledge transfer with anticipatory thinking occurring at every level of public administration, from frontline service delivery to top-level decision-making.

The challenges faced by the public sector are complex and hard to predict. Thus, the public sector should develop a vision that is flexible enough to accommodate changes and revisions during implementation; the shocks of the COVID-19 pandemic, for instance, underlined the importance of adaptive policies, delivering cross-agency programs, and working effectively in teams – and doing so faster and better, often with reduced budgets.

This also refers to the necessity of feedback loops in policy cycles to develop more adaptable, flexible government strategies. By using agile methods, changes can be anticipated at a very early stage or considered by rapidly changing the initiatives project/policy successful and high-quality services/policies can be achieved faster. 71% of organizations [9] have adopted agile planning methodologies, and 60% of those companies increased their profits after doing so.

Agile strategy is about:
• planning long-term visions, plans, projects and initiatives, while considering flexibility and adapting to unexpected circumstances;

• adapting rapidly during implementation given unexpected changes.

This competency is linked to the adaptability civil servants need to have when working on digital transformation. It is certainly linked to agile execution as well. However, it focuses on the development of a vision that is flexible, while agile execution focuses on implementation of the vision.

Data use and governance represents a combination of competencies that enable civil servants to understand the fundamental role and value of data and its inherent risks, and the ability to use, analyze and share it, taking into consideration ethical, privacy and security concerns. This domain is fundamental for civil servants to be able to address governance challenges and meet the public's growing expectations from governments while at the same time use data effectively and responsibly.

Digital literacy technologies in society, governments' role in meeting public expectations, managing increasing pressures on budgets and responding to new policy issues has become challenging, as digital disruption means constant change and rethinking ways of operating to deliver public value in the public sector.

Digital literacy for the public sector has become one of the top priorities worldwide – civil servants need to be able to use ICT tools to improve internal processes, deliver better services, and respond to the public's changing needs. It is also essential for understanding complex, socially relevant phenomena such as global economic and financial interdependence, social inclusion, migration, or climate change.

Digital literacy is about:
• confidently and critically using ICTs to address the needs of the public;
• addressing problems through the use, analysis and interpretation of data that measure underlying phenomena.

This competency is linked to other competencies such as problem identification and solving, data use, privacy and security but also trust and curiosity.

The public sector worldwide has put relevant (big) data as key elements of digital government strategy globally. The availability of digitally generated data and creation of computational algorithms to analyze it provide new ways of solving complex problems and delivering services. In this sense, governments want to put data at the core of digital transformation.

A data-driven public sector (DDPS) recognizes that data is an asset, core and integral to policymaking, service delivery, organisational management, and innovation.

Data-driven decision-making is about:
• understanding, analyzing, organizing, using and sharing data;
• using data to respond to problems more efficiently and effectively;
• using data to promote evidence-led policymaking
• understanding, interpreting and using data to make informed decisions;
• e bedding a data culture in the organization.

This competency is linked to trust of other people in the organisation, because an exchange of data and information is key. It is certainly linked to other competencies such as data literacy and privacy and security.

Governments are launching open government data (OGD) portals that enable data to be accessed and used by everyone. This not only contributes to data-based decision-making, but directly influences public trust, confidence, and satisfaction with government, because OGD enables the public to monitor performance and facilitates data-based solutions and services (and co-creation of services). The common objective is to ensure that data is owned and used by the public, fostering a better life through public engagement with government and technology. This dimension also relates to the right of access to public information (RTI).

Open data is about:
• understanding the importance of ownership and transparency when it comes to data;
• creating open mechanisms, frameworks and standards for data while respecting human rights, evidently privacy.

The public sector's ability to deliver high-quality services, develop well-targeted policies and ensure efficient government depends on the effective use of knowledge, information and data – including people's personal information (such as tax returns, welfare benefits, law enforcement records, driving license information, among others).

Handling this data raises many human-rights issues, including about privacy and the balance between individual rights and the common good. With more data around the world and in the public sector, there is a potential risk for uses of digital technologies that violate human rights, basic principles of information privacy and security through unregulated access to personal data stored in different nodes of the global network (hacking, for instance, is a growing challenge).

The public sector holds a huge amount of data, which sometimes (such as in the case of health records) is very personal and needs to be treated sensitively. Whereas privacy mainly concerns the protection of one's own information and that of others, identity management refers to being in control of one's online profile, and security relates also to a person's awareness of how online actions and behavior can put both at risk.

Privacy and security is about:
• understanding the basic issues, concerns and threats around privacy and security;
• effectively managing information shared online using tools (navigation filters, passwords, anti-virus and firewall software) to avoid dangerous or unpleasant situations, or to maintain a level of anonymity;
• designing government strategies and policies to integrate and address privacy and security concerns.

The emergence of digital technologies presents a challenge for the public sector, with legal, regulatory and ethical frameworks needing to be revised to consider these elements and innovations.

Legal, regulatory and ethical frameworks are about:

• understanding if a digital transformation initiativee conforms to existing human-rights standards and legal frameworks, or operates in a legal vacuum that requires the enactment of new laws;

• drafting and implementing legal and ethical frameworks that take into consideration digital technologies and their impact on societies.

Having adequate internal expertise on AI technologies is crucial to initiate, develop and use these technologies in public administration. Without an awareness of AI, or the ability to work effectively with these new technologies, it is likely that AI will not be successfully adopted in the organisation.

AI fundamentals are about:

• being aware of the opportunities of AI technologies and where they could be used in different work;

• knowing the risks and limitations of AI technologies, such as algorithmic bias, threats to human rights, poor explainability and performance issues;

• reviewing, evaluating and developing AI systems alone or in collaboration with external partners.

Digital Management and Execution concerns the need for civil servants to incorporate management practices that enhance the success of digital transformation initiatives. This includes managing and implementing projects and policies in an agile and collaborative way.

The idea of engaging with the public to get feedback on service delivery is not new. However, it has become a fundamental element of the work of many governments worldwide. Moreover, there has been a clear shift from just interacting with the public to understanding needs, to even co-designing services with them. Indeed, the consensus is that by taking a people-centric approach to policymaking and service delivery, governments can rebuild trust in public administration, improve the effectiveness of public action, and better respond to the global and domestic challenges.

The use of the term 'people' encompasses both users and 'non-users' of digital services (people that may be left out of the digital transformation process – for instance in some cases women, youth and marginalised groups, yet should be considered in the development of digital transformation and digital governance initiatives).

People-centricity is about:

• developing services and policies by focusing on understanding people's needs [1];

• considering the access, responsiveness and quality of service delivery when interacting with people;

• taking into consideration the public and private experience and needs of users in digital public policies and technologies ('user' understood as both citizen and public servant).

Most commonly, iteration is associated with modern software development practices where new features or updates to functionality are released when they are ready, rather than a "big bang" approach that releases many new or updated features simultaneously.

However, this has also become important in the public sector for designing and developing digital transformation projects – it is indeed crucial to test the solutions and products developed as part of those projects through iteration and experimentation. This competency encourages civil servants to take small, calculated risks in the development of digital transformation projects. The iterative practice is composed of multiple skills, such as managing innovation projects, using prototypes to explore approaches, and conducting tests and experiments.

Iteration is about:

• improving what is currently available, and using incremental, often rapid approaches in the development of a project, product or service, while reducing risks;

• accepting mistakes as part of the project cycle and learning through them.

Agile execution becomes essential when designing and developing digital transformation projects. This applies to the public sector, as collaboration, adaptability and flexibility should be integral parts of implementing projects to deliver digital services. Indeed, when working on digital transformation, effective collaboration – and not working in silos – becomes extremely important.

Every aspect and element of the government system needs to be taken into account and have the same level of adaptability – for instance, when developing a digital transformation project in different parts of the country, procurement needs to be flexible enough to allow changes during implementation to test an adapted service or product with different users.

Agile execution is about:

• understanding, using, and applying agile management techniques;

• communicating and collaborating effectively with other departments, ministries, or external partners;

• considering the organisational structure and finding ways to overcome bureaucracy to focus more on outcomes than function and traditional approaches.

This competency is also related to several attitudes, as described above. Applying it is only possible in an environment conducive to experimentation and learning.

Digital transformation best practices from the private sector show the importance of digital teams having the right environment to work, with structure and discipline, and freedom to experiment and test. Developing an inspiring vision and the right 'culture' is at the core of digital transformation.

It should be developed by all civil servants who work in teams to contribute towards shaping an environment conducive to innovation. Digital leadership is especially nurtured by those who can create the right environment, motivate employees, and establish digital teams. Digital transformation should be led by teams that are able to innovate and iterate even more than in other sectors.

Digital leadership is about:

• empowering teams in the government by creating enough room for members to take initiative, test and experiment with a common vision;

• reating a user-driven service vision;

• understanding how technology can feed user needs.

II. CHALLENGES AND OPPORTUNITIES OF DIGITAL TRANSFORMATION IN GOVERNMENT

Challenges and Opportunities of Digital Transformation in Government

The exponential growth of digital technologies have changed the way in which societies, as well as entire economies, function, "including their structure, how production is carried out, the breadth of consumer choice, the nature of labor markets, and the need for new skills" [2].

1. Companies have expanded into the digital field with the promise of scalable software and other solutions complementing the traditional, non-scalable business model of consulting.

For instance, in the pharmaceutical and medical industry, companies have invested heavily in digital solutions given the labor-reducing impact that robotics, software-guided medicine and AI-supported diagnostics can have on services.

These digitally transformed services have a proven potential to enhance health outcomes by improving medical diagnosis, data-based treatment decisions, digital therapeutics, clinical trials, self-management of care and person-centric care, as well as creating more evidence-based knowledge, skills and competence for professionals to support healthcare [3].

Digital transformation requires governments to rethink the ways in which they have functioned so far and to take into consideration a new set of digital principles and standards. According to the OECD, a "business as usual" approach to technology that reinforces existing internal government processes only leads to failed projects and public criticism [4].

OECD Digital Government Policy Framework

Establishing clear leadership, paired with effective coordination and enforcement mechanisms so that 'digital' is not only a technical topic but a transformational element for rethinking and reengineering public processes, simplifying procedures, and creating new channels of communication and engagement with public stakeholders.

Recognizing data as a strategic asset and establishing governance to generate public value through planning, delivering and monitoring public policies and services while adopting rules and ethical principles for trustworthy and safe access, sharing and reuse.

An ecosystem of guidelines, tools, data, standards and common components that equip teams to focus on user needs in public service design and delivery.

Making government data and policymaking (including algorithms) available for the public, within the limits of legislation and in balance with the national and public interest.

Awarding a central role to people's needs and convenience in the shaping of processes, services and policies, and by adopting inclusive mechanisms for this to happen.

To anticipate people's needs and respond rapidly so that users do not have to engage with cumbersome processes associated with service delivery and data.

Commonly agreed definitions of digital transformation in the public sector focus on elements of 'transformation', highlighting how a change in a government's way of working and functioning is necessary for the public sector to succeed. For UNESCO, digital transformation is the process of accelerated development and pervasive use of digital technologies that generates new opportunities and challenges for sustainable development. In this specific context, it also refers to "the process of using digital technologies to create new – or modify existing – work processes, the culture of an organization, and at highest level, a countries' digital enabling environment (policies, regulation)".

This section discusses the challenges and opportunities of digital transformation in government and anchors the competencies identified in the previous section within these challenges and opportunities. Illustrative examples and case studies help situate these challenges and opportunities within past or ongoing digital transformation processes in governments.

Definitions of digital transformation

Public Digital
Digital transformation is the act of radically changing how your organisation works, so that it can survive and thrive in the internet era (https://public.digital)/

Gartner
Digital transformation can refer to anything from IT modernization (for example, cloud computing) to digital optimization, to the invention of new digital business models (https://www.gartner.com/en/information-technology/glossary/digital-transformation).

OECD-OPSI
Digital transformation refers to a process of adoption of digital tools and methods by an organisation, typically those that have either not been including the digital factor as part of their core activities, or have not kept up with the pace of change in digital technologies (https://oecd-opsi.org/guide/digital-transformation).

Opportunities of Digital Transformation in Government

Digital transformation can help advance the achievement of the Sustainable Development Goals (SDGs) [5-7]. Digital government can act as an enabler of sustainability, equity, and social inclusion [8]. ganisations (G2G), between business and government (B2G), as well as between governments and citizens (G2C), can support the formulation and monitoring of policies to achieve the SDGs [9].

Artificial intelligence (AI) technologies have caught the interest of the world for their potential to transform societies. They are defined here as "systems which have the capacity to process data and information in a way that resembles intelligent behavior, and typically includes aspects of reasoning, learning, perception, prediction, planning or control" (UNESCO, 2021) [10].

What makes AI distinct from other emerging or traditional information technologies is its capacity to learn from previous examples captured in digital data, leading to the creation of accurate predictions based on existing data rather than pre-programmed rules. Furthermore, unlike previous technologies, of particular interest is the capacity of AI to conduct tasks previously been expected to require human intelligence. As a result, AI technologies are increasingly used for perceiving, listening, finding patterns in data, predicting or even acting autonomously in decision-making processes.

While on the one hand, AI is known for causing concern for its potential disruption to labor markets and causing loss of jobs, it can provide public administrations with immense opportunities in tackling current societal challenges. Digital technologies, and in particular AI technologies, are heralded as a key instrument to assist the public sector in a series of undertakings by, for instance, reducing administrative workload, and providing innovative insights on current challenges.

Of particular interest for the Global South are AI developments that can improve multiple sectors: agriculture, by combining meteorological data, satellite imagery and farm data to optimize farming activities and end hunger; education, by optimizing individual learning, such as assisting in writing to improve literacy rates, or even AI education in itself; environmental protection, by using satellite data; and others.

As such, there is a great hope that AI technologies can be harnessed increasingly to meet the SDGs., similar to the enthusiasm of previous technological waves. New technologies will not enhance socioeconomic development automatically, as the impact of ICT depends on various political and cultural factors too, illustrating the importance of civil servants' competencies in shaping the broader ecosystem in which they are to be implemented.

Use of AI to combat improve service delivery in Latin America

Context

Information and communications technologies (ICT) are increasingly seen by governments, as well as activists and civil society, as important tools to promote transparency and accountability and to identify and reduce corruption. This can help to monitor the efficiency and integrity of social services and make financial information more transparent. At the same time, AI has and is being used for delivering better services.

Solution

Brazil

One example of the use of AI technologies by non-governmental actors to reduce governmental corruption is Rosie, an AI system that analyses the public expenses of Brazilian congress members to detect suspicious spending patterns. Rosie has been developed as part of Operation Serenata de Amor; a project managed by 600 citizens from all over the world. Rosie uses public data made available by the Access to Information Law, open data from various public administrations in Brazil, as well as publicly available information from companies.

Panama

In 2012, the National Authority for Government Innovation (AIG) in Panama launched a six-year project with the aim of providing an end-to-end experience of the justice system. This transformation involved disaggregating the existing complex process to understand the needs of the service providers and users. This made it possible for the government to effectively address individual elements related to the physical infrastructure and interactions among the relevant stakeholders from the back-office to the front public-facing office.

AI deployment by government agencies to improve operations is in its nascent phase, with emerging insights only beginning to highlight its potential. The opportunities come in the form of improvements to public service delivery, internal management and citizen-government relationships. Regardless of the form in which AI is introduced it has proven to be useful for automating mundane tasks traditionally done by civil servants or citizens, augment decision-makers' impact by providing them with additional insights based on data, or make services better tailored to the public through personalization.

Most of the insights gained so far about administrations using AI to enforce their own operations comes from either North American or European contexts – limited examples of the use of these technologies by public administrations in the Global South exist. Several examples of AI technologies and their respective potential benefits for public administrations can be found in the Figure 3.

Despite the potential benefits of AI, there are also considerable human rights and ethical risks related to the use of AI technologies, which should be considered before and during the development and deployment.

In response to these risks, UNESCO developed the only global Recommendation on the Ethics of AI, endorsed by 193 Member States, which with the associated tools helps address, mitigate or avoid some of the key risks to societies. The UN also endorsed a system-wide strategic approach and road map for supporting capacity development on AI ("Strategic Approach"), developed by the High-level Committee on Programmes (HLCP) under ITU's lead, to guide UN agencies towards prioritizing support to Member States, particularly developing and least developed countries, in this respect. In 2021, the UN set up an Inter-

Agency Working Group on AI (IAWG-AI), co-led by ITU and UNESCO, to bring together UN system expertise on AI with an aim to harness the benefits of AI technologies while addressing the risks.

	AI type	Improved activity	Example
	Computer vision	Policymaking (Netherlands)	**Trash detection:** The Object Detection Kit utilizes computer vision on digital imagery to detect trash on the streets of Amsterdam municipality, enabling the early detection of garbage, and optimization of collection routes.
	Robotic process automation	Public service (Sweden)	**Automation of state benefits:** The municipality of Trelleborg uses robotic process automation for various social benefits, and the waiting time for a decision – formerly up to 20 days – has been reduced to about one day.
	Robot	Public service (Spain)	**Misty II:** A pilot project is using care robots to improve quality of life for the elderly population of Barcelona. The robots will be tasked with reminding them of appointments to take medication and act as a companion.
	Virtual assistant	Public services (Singapore)	**OneService chatbot:** In Singapore, the Municipal Services Office (MSO) and the Smart Nation and Digital Government Group (SNDGG) launched a chatbot that enables residents to easily report municipal issues via WhatsApp and Telegram.
	Predictive analytics	Public service (Belgium)	**Talent API:** The Flemish unemployment agency uses an AI system to match job seekers with personalized recommendations for jobs based on both data and historical matches, so staff members can provide tailored recommendations.
	Computer vision	Public service (Argentina)	**Pothole reporting:** In Buenos Aires, a machine-learning based tool lets the public report urban issues such as potholes to the municipality.
	Predictive analytics	Internal management (USA)	**BuySmarter:** The US Department of Health is using an AI system to analyze the administration's contract data and suggest better prices for bulk purchases.
	Audio	Internal management (Estonia)	**Hans:** Estonian Parliament uses AI system HANS to transcribe all its parliamentary systems and no longer requires stenographers. However, the output of Hans is still corrected by an editor.

Figure 3. The potential of artificial intelligence for the public sector

One of the first considerations is the risk that AI systems can be extremely opaque in the way they come to a decision. In particular, the inner workings of some machine learning algorithms, such as approaches based on neural networks, are difficult to explain. Other techniques used for the development of AI systems may be more transparent and explicable – but often come at the cost of predictive performance, and how explicable it is still depends on the expertise of the non-technical domain experts working with these systems. Furthermore, many AI systems are not only opaque due to the challenges of interpreting specific algorithms, but also because many are developed and sold by private companies, and thus the inner workings are often proprietary [11].

Consequently, decisions based on AI technologies may be impossible to explain to the public and policymakers, which raises concerns about accountability and transparency, considering the impact they could have on the lives of citizens. Unforeseen negative consequences of AI systems can be seen in the case of use of AI to fight tax fraud in the Netherlands, whereby some citizens were incorrectly labeled as fraudulent, before the problem was discovered and corrected [12].

Combined with this opacity is the risk that AI systems can amplify societal biases in their recommendations, with minority groups systematically finding AI systems recommending less favorable treatment. Bias could be mitigated by collecting more accurate public data, and by making datasets more inclusive and representative of the population, especially for the use of AI in the Global South where only limited data is available.

However, excessive data collection by public administrations could also threaten citizens' privacy and result in the resistance to the use of AI by government authorities, especially if not accompanied with additional obligations to ensure accountability to mitigate bias [13].

While private organisations are known for large-scale data gathering with apparent consent, there is concern when government authorities collect and analyze data from the public. Nevertheless, not all forms of bias [14] can be mitigated effectively by collecting more data and requiring other approaches. For instance, historical bias due to past practices in data generation and collection, and measurement bias due to the use of incorrect proxy variables to represent concepts might, in fact, get reinforced. As a result, the often-depicted narrative of providing more objective and accurate decisions due to increased availability of data is at odds with the many documented biased decisions taken or suggested by AI systems [15] that occur because of historical and human biases.

The development and deployment of AI technologies within the public sector may face ethical and legal barriers to get started or be implemented. Understanding the legal context in which the system is deployed and the limitations of the legal framework are critical to avoid systems being disbanded later by court decisions, as well as to ensure high rates of acceptance of AI among both management and the public. While the Global South tends to have less data protection legislation, allowing for higher degrees of freedom in the use of data, this brings additional concern for introducing surveillance or potential misuse of these technologies by private and/or public administrations.

Even if digital transformation is believed to be key to addressing some XXI century challenges, several studies have shown that many digitization initiatives – both in private and public sectors – are unsuccessful. There is a growing body of literature that shows how cultural, organisational, and structural barriers can be an important obstacle to digital transformation in the public sector. It is important to understand common digital transformation related obstacles, in order to harness this competency framework and overcome different barriers.

Many digital transformation projects never make it beyond the conception phase due to a lack of innovative thinking within public sector organisations. Innovating upon existing processes by questioning traditional work practices or bringing up new ideas is not actively supported let alone rewarded at work.

Fear of failure can be detrimental to digital government transformation using AI technologies, as they are still of an experimental nature. Especially with regards to their use in a public sector context, there is little known of either their positive and negative effects, or their effectiveness. A riskaverse and scarcely resourced public administration may thus find little incentive to use technologies with unknown impacts, especially if there is a strong risk of

negative media reporting of mistakes. A known failure with AI technology in one area may thus significantly change the perception of civil servants if the impacts inhibit them using it themselves – even though the type of AI technology, application area and/or risks may differ from the situation involved in the failure.

Furthermore, as AI systems can make mistakes as they learn, especially in early iterations, some tolerance and patience are crucial to let systems improve over time. It thus requires a strong innovator to overcome such organisational risk aversion, especially when an AI system's first results do not meet expectations.

It is important to underline that deployment of AI-based solutions should be done with adequate oversight and analysis of potential impact through risk assessments. Evidence shows that many government executives do not promote a culture of innovation, do not structure teams accordingly, and do not let them innovate using calculated risk. According to recent research by Gartner (Figure 4), most government Chief Information Officers (CIOs) are exploring or deploying digital services to public and other stakeholders, yet many of the obstacles they face are nontechnical [16].

Siloed strategy and decision-making, risk-averse culture and insufficient budgets are among the biggest challenges to scaling digital solutions – and those elements can only be addressed by leaders in the organisation.
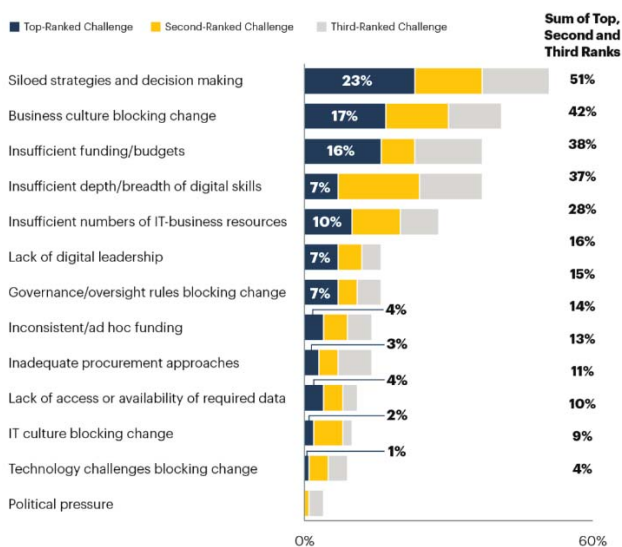

Figure 4. Top challenges for government Chief Information Officers (CIOs) to implement digital solutions

Leadership plays a major role in achieving digital transformation projects. Indeed, the way leaders shape an environment for digital teams is essential for them to be able to follow a clear vision and goals while developing, experimenting and testing ideas for achieving them.

Digital leadership is thus an incredibly important key to the success of any initiative or for the completion of digital government transformation. However, an estimated 80% of public-sector leaders say they have fallen far behind private capabilities, with only 26% having the leadership to successfully execute the digital transformation strategy [17].

Digital transformation often highlights the need for new forms of leadership – with a digital mindset – to correctly guide the organisation's transformation with technology. This requires leadership to allow for faster decision-making processes and a more transparent and open form of communication, while ensuring that innovation projects are led by user needs – not institutional demands. An altruistic, transformational, entrepreneurial and network-oriented leadership style is needed.

However, such leadership styles can often be at odds with more traditional, closed, hierarchical leadership styles commonly found in public administrations. A management supporting a rigid hierarchy, departmental silos and top-down decision-making can hinder innovation in government, or put an end to innovation that impacts their authority. On the other hand, some countries have advanced in their digital transformation journey through leadership support.

Japan's Digital Agency as an example of strong digital leadership

The Recommendation of the Council on Digital Government Strategies emphasizes the importance of leadership and political commitment for successful digital government strategies (OECD, 2014). It is vital that the highest levels of governments, whether elected representatives or their appointees, recognize the value of putting digital, data and technology at the heart of a public administration's future. Indeed, having a supportive leadership helps to sustain a government's ambition to apply digital, data and technology in transforming how they function to meet the needs and expectations of citizens and businesses.

Japan's Digital Agency was established on 1 September 2021, with the mission to promote the digitalization of public administrative procedures, the standardization, interoperability and coordination of data systems, and the provision of more user-friendly public services. Legal, regulatory and operational silos have been the key challenge in the digitalization of the public sector. The Digital Agency is a major economic policy priority for the Prime Minister, who personally headed the initiative as Head and Chief Minister of the Digital Agency, and appointed the Digital Minister to lead the Digital Agency's operations, along with its Chief Officer.

Digital transformation requires leaders to develop a clear strategy and vision. This is essential for clarifying the long-, medium- and short-term goals of the organisation and how they will be achieved. Moreover, this helps employees to better understand how they are contributing to the vision, which can drastically improve their effectiveness and productivity.

This holds true for public sector as well as digital government strategies are critical in providing policy and planning guidance in a constantly and rapidly evolving work

environment. Strategies make it possible to align goals, objectives and initiatives and are fundamental in establishing consensus and the necessary cross-government coordination for efficient and effective policy implementation. It is also important to note that as digital transformation requires flexibility and adaptation strategies need to be designed accordingly.

This is not always the case in the public sector as not all governments have developed clear strategies for their digital transformation efforts, nor do they do so when developing digital initiatives and projects. Indeed, it is often simply the lack of an internal (AI) strategy which often leads to isolated and ineffective (AI-based) digital innovation projects [18].

Developing flexible and adaptable strategies in Australia and Tunisia

Governments and public sector organisations work on some of the world's most pressing, multifaceted and high-stakes challenges. The same pressures that affect private sector also affect public-sector organisations, many of which were suddenly faced with the same volatile, uncertain, complex and ambiguous environment while dealing with the COVID-19 pandemic, not unlike what private organisations face with the rise of disruptive online competitors. Increasingly, public servants find themselves having to be creative problem solvers while navigating hierarchical, rules-based environments and complex procurement and partnership processes, and all with public scrutiny from individuals, communities and businesses with high expectations. Agile ways of working can be transformative in helping governments overcome these challenges.

Objectives and key results (OKRs) is a simple tool to create measurable goals for agile teams. It provides a framework for defining objectives, how teams will achieve those outcomes, and tracking their progress. It was developed by Andy Grove at Intel and has since been adopted by other product organisations such as Google, LinkedIn, Twitter, and Uber. An objective is a bold and qualitative goal that the company or organisation wants to achieve. A key result is a tangible and quantitative goal for how a team will achieve an objective.

Often in an agile transformation, OKRs are used as a complementary goal management framework to help organisations define strategic goals and measure outcomes. OKRs are future-focused and action-oriented. Objectives define what we want to achieve and key results measure how we meet the objectives.

OKRs are sequenced and measured throughout the quarter. They help to break down ambitious goals into more manageable pieces and create visibility on what is working and what is not working in a timely manner, thus acting as a focusing tool to help organisations prioritize their top objectives. Importantly, OKRs inspire organizational convergence by combining both top-down and bottom-up approaches to goal setting. They can be defined and linked at every level in the organisation. For public-sector organisations with hierarchical structures, OKRs help rally teams behind shared goals and create early opportunities to strengthen or refocus resources on projects.

A primary challenge in implementing digital transformation is the infrastructure gap that affects certain countries. Nearly 300 million people in Africa, for instance, live more than 50km from a fiber or cable broadband connection. Hence, the lack of widespread availability of high-speed internet remains a significant hurdle for African countries to fully harness the potential of digital transformation [19].

To reap the benefits of digital transformation, abundant and low-cost connectivity is essential as broadband drives productivity, innovation and growth. In fact, one of the specific goals of Africa's Digital Transformation Strategy is to create a harmonized environment that guarantees investment and financing, which can be used to close the digital infrastructure gap and provide accessible, affordable and secure broadband, across demography, gender and geography.

A further barrier that limits digital transformation and AI implementation in public administrations has to do with organisational maturity related to data governance. Since emerging AI innovations are generally based on data, public administrations – as well as the ecosystem in which they operate – must have sufficient quality and quantity of data for analysis. Significant work is needed to provide public administrations with mature data infrastructure on which AI can be built, thus one of the primary goals for public administrations is to reach an adequate level of digitalization to develop this data infrastructure. Strong data infrastructure and corresponding data governance regime are the two most important building blocks, providing the technical infrastructure required to collect, store and analyze data. The project data should be available in the right quantity – as many AI systems rely on a significant volume of representative data – as well as the right quality. Strong data management practices within the organisation are crucial to allow for the right maintenance of the data used by AI systems and to create trust when other organisations share data with the institution.

It is often suggested that before any AI project gets started, a data specialist should first examine if the data, which is needed for the success of the project, is available, accessible and legal for use in the organisation. Furthermore, as one of the main benefits of the use of AI technologies is not just to analyze the internal administrative datasets, but to combine it with external data to reveal additional insights, the data infrastructure should adequately support the integration of these external sources. External data often has different standards and formats, requiring an ability to merge it. It also requires cleaning before analysis.

Countries in the Global South score significantly lower in terms of government AI readiness. The required infrastructure and data to support AI development is mostly available in the USA, countries of the European Union, and China with other regions (greatly) lagging. A lack of

dedicated infrastructure on which to train data-intense AI applications (such as adequate GPUs) can stop most AI projects before they are considered for implementation. Furthermore, the Global South has the most people who have never used the internet. According to the Alliance for Affordable Internet, a decent internet connection is out of reach for 90% of people in low- and middle-income countries.

This significantly affects the representativeness of data, if it is available at all. The e-Government Development Index of the United Nations shows the differences between the Global North and Global South with regards to the previous e-Government and digitalization progress. Although this does not mean that AI projects are impossible, the framework conditions facilitating AI projects are less favorable – especially considering that even advanced e-Government countries have difficulties in integrating AI.

There are several reasons for why there are important skill gaps, including the constant revision and update of technology. A recent World Bank report highlights that reasons range from availability of knowledge to level of compensation, as well as the constraint of underdeveloped human resource management systems. The UNDP digital strategy is embedded in a broader system at a societal level.

For instance, the elements depicted in the figure are also influenced by considerations such as a supportive institutional and regulatory framework, the right organisational culture, thinking in systems, proper data governance, ICT infrastructures, and so on (Figure 5).

Figure 5. UNDP whole-of-society digital approach

Competencies represent only one element of the 'government system' as a whole. Like any organisation, the government system is built around a series of elements (people, budget, regulation, etc.).

The rigidity of procurement created obstacles that hampered the implementation of the project even if some officials had acquired some important digital competencies. For instance, the new digital strategy by the United Nations Development Programme (UNDP) illustrates a whole-of-society digital approach (Figure 5) that includes elements on developing enabling infrastructure, improving accessibility to digital connectivity and tools, and supporting people's digital capacity and competencies.

The gap between the public and private sector salaries also makes it challenging for countries of theGlobal South to acquire such in-house expertise. Talented individuals who are well-versed in data analytics may, instead of working in a local administration, take a position in a well-paying technology company – possibly even in another country or continent, leading to brain drain. In addition to the gap in AI-related skillsets, a complementary understanding of how to successfully integrate AI technologies in public administrations are also lacking; these include an overall unfamiliarity of what AI technologies could mean for an organisation and how to change its technical and social elements to make the AI system compatible. This makes it challenging to implement AI in government.

However, as mentioned above, AI ability goes beyond the mere understanding and use of technology; it is related to the ability to see the potential of AI, develop and test it, and integrate the system into the organisation. This is essential for a successful digital transformation with AI technologies. Similarly, AI capacity goes beyond the technical skillsets related to data analytics (e.g. the ability to train machine-learning models), also including those needed to change the organisation in order to get the maximum value from the technology.

A second level of AI literacy thus means being able to use these technologies and apply them. This includes more advanced knowledge on how AI applications could or do affect lives and understanding how ethical dilemmas may appear from use of these technologies.

In this case, civil servants would apply AI concepts into their own operations without necessarily developing these systems themselves. Ideally, such a level of AI literacy is needed for those working with an AI system and the management who handles integrating the system in their operations. Only in the last and most advanced levels of AI literacy are civil servants equipped with such competency to create and evaluate their own applications.

Such competencies are often reserved for a specialist with a data science background and so it is unlikely that staff would operate at this level, and unnecessary. What is important, however, is that throughout the public administration, such a level of AI literacy is possessed by someone so that the administration's AI system can be properly evaluated. Also, AI technologies have other complexities and require consideration of the government's existing

capabilities because AI is typically not easy to use from the start; it requires more intra- and interorganizational collaboration, and both monitoring and adjustments over time. Indeed, developing AI not only includes the mere development of the technology but also includes an understanding of the whole organization to be able to see the potential of AI, develop the AI, test the system, and integrate the system into the organization.

Beyond that, developing AI technology should not only focus on the changes made to the existing organisational technical system, but also take into consideration the wider social-technical changes required to make maximum use of the technology. This may require changes to work processes, resources and their staff's skillsets, the organizational culture and structure, as well as interorganizational structures as a wider part of public management. Integrating AI systems into work processes is where they will provide the most value [20].

III. RECOMMENDATIONS

In light of their findings, the members of the Broadband Commission Working Group on AI Capacity Building put forward a series of recommendations for International Organisations, government, academia, civil society and the private sector.

1. Raise awareness of the competencies needed by civil servants to implement digital transformation in government, and to create an enabling environment for digital transformation in societies through improved digital governance

Options for Action

Organize global, regional and national knowledge exchange and awareness-raising events around digital transformation to discuss the importance of digital competencies in the public sector, and to disseminate the framework to the target audiences.

Advocate for greater coherence and coordination in digital capacity-building efforts for civil servants based on the framework, in line with the UN Secretary-General's Roadmap on Digital Cooperation and the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021).

2. Support governments in contextualizing and adapting AI and digital transformation competencies for civil servants based on the diagnosis of capacity-building needs at individual, team, department and government levels

As this framework is meant to present governments worldwide with a usable set of AI and digital transformation competencies for the public sector, it is important to adapt it based on contextual factors. For instance, the type of digital competencies (and level of proficiency) needed can differ significantly as some civil servants may have already strengthened their digital transformation competencies. At the same time, there may be the need to develop a sequencing of the type and size of competencies countries need at different stages of digital transformation.

Options for Action

Develop a diagnostic tool for all civil servants to assess AI and digital transformation-related levels of competency at individual, team, department, and government levels to enable governments to develop capacity-building programmes as per needs and context. Ensure that the tool is available as a digital public good that can be easily adapted by governments for use in different languages.

3. Enable capacity building by making learning resources and training content openly accessible that can be used, tailored and adapted at the national level to train civil servants on relevant competencies

The framework provides a comprehensive overview of AI and digital competencies needed for the public sector to design and develop digital-transformation projects and policies. The resources and tools should be developed in an iterative process that involves pilot testing and learner feedback.

Options for Action

Develop an open learning hub that provides access to existing and new courses to enable civil servants to acquire different levels of proficiency related to AI and digital-transformation competencies.

Develop an open curriculum with different learning pathways based on civil servants' needs, and the national digital-transformation context.

Facilitate training for civil servants through a network of training institutions and trainers, including at the national level, equipped to support capacity building based on the competencies identified in the framework.

Identify and test models of capacity building that can help civil servants as professionals coming from diverse academic backgrounds acquire and practice the AI and digital-transformation competencies through project-based learning, on-thejob training, public-private peer learning, and hackathons with a focus on application, among others.

4. Support governments in monitoring the impact of capacity-building initiatives on digital transformation-related outcomes in the public sector

It is important to understand the impact of capacity-building initiatives on digital transformation-related outcomes, as governments invest significant resources in training civil servants to implement digital transformation projects.

Options for Action

Identify, adapt and, as needed and desirable, develop qualitative and quantitative tools to measure the capacity of civil servants.

Explore collaboration with universities and research centers to develop impact-measurement tools.

Research the contribution and impact that increased civil-servant capacity has on a national digital transformation journey, and share best practices.

5. Foster cooperation between international, regional and national organisations that support, including civil society organizations, supporting training of civil servants, to facilitate knowledge exchange and mutual learning

Options for Action

Develop a coalition of training institutions, universities, civil society organisations and think tanks to facilitate exchange of good practices on AI and digital transformation-related capacity building for civil servants

Provide a platform for coalition partners to convene globally to exchange best practices and knowledge with respect to AI and digital transformation-related capacity building.

6. Governments should take a holistic approach towards digital transformation, first developing a national digital transformation and AI strategy, then a digital action plan on strengthening digital competencies, which are included in this framework

As shown in the report, digital competencies are a crucial element contributing to the success of digital transformation projects, yet this is just one of the dimensions of the overall 'government system'. In that sense, these AI and digital transformation competencies should be integrated in a broader digital strategy.

Concerning AI in the public sector, it may be appropriate to start by raising awareness to showcase benefits of AI to public-sector stakeholders in collaboration with global industry leaders and local innovation ecosystems.

Options for Action

Develop a digital transformation strategy, at national level, underpinning all the digital transformation efforts the country aims to undertake;

As part of this strategy, develop a detailed national civil-service digital competency action plan to build on this framework and inspire governments. The digital competency action plan should, in principle, clearly detail: potential competency gaps (by setting a baseline); specific competencies to be developed and how to do so (i.e. upskilling); sufficient budget allocation; and a measurement matrix including results and indicators focused on digital competency building.

7. Governments can start 'piloting' the AI and digital transformation competency framework by developing capacity-building programmes and trainings as part of their digital transformation initiatives

Building on this framework, the diagnostic tool, and learning resources outlined in the above Recommendations, governments could implement the AI and digital

transformation competency framework in new or existing digital projects.

Options for Action

Develop new – or strengthen and adapt existing – capacity-building programmes to enhance AI and digital transformation competencies in government. For instance, in a new digital transformation project a government may want to use this framework to get a general overview of the major digital competencies; identify those that the project needs to succeed; deploy a capacity-development strategy to strengthen them.

Include an evaluation of the required competences for digital transformation to assess the feasibility and potential success of digital government initiatives before and during their launch. A stronger awareness of current limitations can lead to additional measures to ensure the value of the initiative is increased.

Allocate adequate financial resources for capacity building within digital transformation initiatives in government.

Organize AI and data hackathons, prizes and challenges to spur responsible AI adoption in the public sector supported by local actors.

8. Universities can leverage the framework to establish curricula and interdisciplinary programs for developing AI and digital transformation-related competencies

Universities could be inspired by this framework to develop curriculum on AI and digital transformation competencies. As research hubs, they could also undertake further research on digital transformation and capacity building.

Options for Action

Develop curricula with the aim of strengthening the digital capacity of civil servants, and also at masters level.

Conduct further research on these elements linked to the framework: the factors contributing and hampering digital transformation; identification of contextual factors in the Global South that should be integrated when using the framework; investigation of further competencies that could be integrated into the framework; help define measurement tools on how to verify the increased capacity of public-sector officials; understand the possible sequence of developing those competencies (i.e. should some competencies be acquired before others for a specific country or context).

9. The private sector can collaborate with governments to implement capacity-building initiatives, and by contributing expertise and knowledge based on experience with digital transformation

In many countries, the private sector and government are increasingly working together on digital transformation initiatives. This applies also to digital skills development; for instance, the private sector at times offers specific opportunities for youth on digitalization (from hiring, to

providing input on curricula, taking part in setup of national qualifications framework, etc.).

At the same time, the private sector is often assumed to be more advanced when it comes to digital transformation, and much can be learned on digital skill development. In that sense, a collaboration with the private sector could be beneficial for governments in terms of implementing digital capacity-building programmes.

Options for Action

Provide inspiration and guidance to the government on how to develop specific attitudes (such as culture of innovation) and skills – taking into consideration the limitations of the public sector in comparison to the private sector.

Help curriculum development based on this framework and identify other key digital competencies.

Sponsor and participate in international competitions and programs to support the development of the digital competencies included in the framework, including through hackathons, and on project learning, among others. For instance, the private sector can actively participate as mentors for teams of youth, especially girls, in hackathons hosted by the government that aim to tackle the SDGs with AI, citizen science and mobile technologies.

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