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# Digital maturity for government organizations – Guide

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# Foreword

## Publishing information

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The guidance in this document is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is “should”.

*Additional commentary, explanation and general informative material is presented in smaller italic type.*

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. “organization” rather than “organisation”).

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# 0 Introduction

## 0.1 General

This PAS provides guidance on increasing digital maturity in government organizations, including in their internal operations, external interfaces and service delivery. The scope of these guidelines includes:

- terms used in the context of digital maturity in government organizations (Clause **3**);
- characteristics and evidence of digital maturity: aspects for organizations to take into account when planning and adopting digital technologies, and the ways in which they can demonstrate their digital maturity, including research, collaboration and organizational processes (Clause **4**);
- measuring digital maturity: how organizations measure their maturity in optimizing their use of digital technologies (Clause **5**); and
- selecting and using digital maturity assessment tools: the factors for organizations to take into account when selecting and using digital maturity assessment tools in optimizing their use of digital technologies (Clause **6**).

## 0.2 Digital transformation of government organizations

Governments and international bodies have highlighted the role of digital transformation in responding effectively to the needs of citizens. All aspects and instruments of government are involved, including policy making, governance, public management and public service delivery [1].

Government responses to the COVID-19 pandemic and other crises have demonstrated the potential for rapid adoption of new practices and technologies, for example the availability of real-time data to support public health decision-making. Progress has been made in other areas, for example in the availability and use of digital channels to access government services.

It is important that government organizations continue to strive to:

- use digital technology to recast the relationship between government and citizens (including foreign individuals and organizations), redesigning public services around people’s needs;
- engage citizens, businesses and civil society in the design and, where appropriate, the delivery of services, policies and regulations;
- adopt inclusive design approaches in the delivery of government services, incorporating user-centred design (UCD) practices;
- make interaction with government as easy as possible for all, avoiding the need to navigate multiple departments and agencies, and to fill out duplicate forms;
- build better services for less, making services simpler and more flexible, drastically reducing costs, and re-engineering processes to become more environmentally friendly;
- research and innovate, with private and public organizations, appropriate provision for value-based application of digital technology and systems;
- remain aware of potential new technologies or threats, and continuously look for emerging technologies that have the potential to be effective in delivering government objectives [2];
- adopt national and international standards on digital services, technology, data and cybersecurity, for use across government; and
- share software with other parts of government and other governments, by openly allowing others to access programmes and adopting an open access culture ([3], [4]).

### 0.3 Data and digital technologies

Table 1 provides an overview of data and digital technologies typified by their purpose in government. A more detailed list of technologies is included for reference in Annex A.

**Table 1 – Types of digital technologies used in government**

| Digital Government function | Purpose of digital technology | |
|---|---|---|
| Service delivery<br>Understanding and predicting the needs of citizens<br>Enabling citizens to use digital services<br>Delivering digital services in real time | Communication<br>Online services<br>Service automation<br>Performance monitoring<br>Predictive asset maintenance | Core infrastructure<br>Data engineering<br>Data capture<br>Data management<br>Data security<br>Data sharing<br>Data analysis |
| Internal operations<br>UCD<br>Leadership and strategy<br>People and culture<br>Legislation and governance | Collaboration<br>Productivity<br>Simulation<br>Training<br>Reporting | |

Data and digital technologies comprise mature technologies with a strong track record of adoption in government, and emerging technologies at an early stage of development or application in government. Whether a technology is considered mature or emerging is largely subjective, and its interpretation depends on the digital maturity of a government organization, as well as developments in the digital technology industry.

### 0.4 Digital transformation opportunities

Emerging technologies and new trends bring opportunities for organizations to transform their digital services and improve citizen satisfaction. They might improve quality of life through enabling inclusive and accessible, user-centred, next-generation services. Some emerging technologies are related to artificial intelligence and machine learning to process big data, personalize services or anticipate events. Other developments, such as linked open data, could contribute to building public value on open data portals. Crowdsourcing and blockchain could contribute to improving the citizen-organization interaction.

Digital transformation has the potential to deliver significant cost savings and labour efficiency gains to government. Examples of quantified impacts include:

- The UK Government identified potential savings of around £1 000 million through investments in digital transformation ([5], [6]);
- The EU has launched a multi-year Digital Decade policy programme [7]. In Italy, e-procurement systems led to cost savings of €3 000 million;
- In Denmark, electronic invoicing saves taxpayers €150 million a year and businesses €50 million a year and the estimated annual savings if introduced across Europe could exceed €50 000 million [7].

Digital transformation requires the development of standards and assurance; capability, leadership and culture; accountability and productivity; and appropriate ethical frameworks to build public trust [8]. All of these factors have the potential to deliver further benefits to government and citizens.

Environmental, social, and corporate governance (ESG) aspects of finance and other regulated industries are receiving attention from governments. Since publishing its 17

Sustainable Development Goals (SDGs) in 2015, the United Nations has noted the importance of digital technologies in achieving SDGs including ESG aspects through digital financial inclusion [9]. The World Bank has highlighted the need for digital technologies to be used to increase energy efficiency (SDG 7) to offset increasing global energy demand [10].

A selection of publicly available case studies is included in Annex B for reference. These case studies illustrate different aspects of digital maturity for government organizations.

**0.5 Digital transformation challenges**

The challenges of implementing digital transformation are recurring themes in recent reviews and guidelines issued by and for government organizations ([11], [12]), and include:

- cost implications and budget constraints;
- whether current technology would be better suited than a novel or emerging technology to meet an organization's needs;
- evaluating the cost and benefit of maintaining or upgrading legacy systems;
- skills and resources in the organization to manage and adapt as technology evolves, particularly at a local authority or department level;
- the implications of emerging technology failing or being discontinued;
- data ethics and regulatory implications;
- making solutions user-centred;
- low risk appetite;
- privacy implications; and
- security implications.

There are a large number of broader barriers to digital transformation that could slow or stop progress. These might apply to the organization and impact internal users or external users. These include:

- lack of awareness of digital technologies and their relevance;
- perceived complexities of integrating digital technologies;
- dependency on legacy technologies;
- misconceptions of costs;
- technical debt;
- lack of capability or capacity;
- accessibility and availability of technology;
- ineffective digital skills training;
- political constraints;
- legal constraints;
- procurement processes;
- lack of proper governance framework and enforcement;
- inadequate documentation (e.g. enterprise architecture);
- customer constraints; and
- poor leadership, for example through a narrow strategy or lack of a cross-functional digital roadmap; failure to engage staff or poor organizational change processes; and/or selecting inappropriate or ineffective digital technologies.

### 0.6 Implementing digital transformation

Integrating data and digital technologies into existing government systems and processes requires not only understanding the technical context, but also addressing internal and external factors, such as:

- agreeing and following one vision or objective, with associated strategic leadership, financial and operational support;
- aligning plans to fit within any organizational constraints and/or context;
- adopting good practice and compliance with legal, governance and infrastructure frameworks in delivering new services that require shared data, processes, integration and systems;
- ascertaining how the technology will work with government service management;
- deciding which skills and capabilities the government organization needs to deliver, support and continuously improve the new technology;
- incorporating proposed technologies into UCD to promote good practice and compliance with national and international standards (e.g. W3C);
- configuring any use of automated decision-making so that it adheres to an ethical framework;
- investigating whether other organizations across government are using or planning to use the same technology [12]; and
- preparing existing data for migration to new technologies, for example through data cleansing, verification and/or validation.

### 0.7 Digital maturity assessment tools

Digital maturity assessment tools support progress by formalizing both the measurement of organizational maturity and an understanding of the areas where improvement is necessary and could benefit through greater use of data and digital technologies. The optimization of digital maturity is contextual, relating to the needs and opportunities of a specific organization and the availability of appropriate technologies.

A strong digital maturity indicates that the organization has chosen the right digital technologies to exploit its opportunities, has implemented them effectively, and is maximizing value in terms of its objectives. A weak digital maturity indicates that action is required to improve shortcomings in strategy, planning and/or implementation in order to avoid failure to achieve an adequate return on investment in digital technologies.

## 1 Scope

This PAS provides guidance on measuring and increasing the digital maturity of government organizations. It is based on the UAE Digital Government Maturity Model [13] and is consistent with similar frameworks. This PAS describes six dimensions for government organizations to address in order to develop their capabilities with respect to digital technologies.

The guidance in this PAS is intended to inspire any leader of a government organization (including departments, agencies and publicly funded programmes and service providers) to make progress with digital transformation. The descriptions herein are written with the needs of the end-users of government services – private citizens, businesses and civil society – in mind. This PAS is also of benefit to developers and providers of digital maturity assessment tools for use by government organizations. The guidelines on the concepts of digital maturity measurement and the selection and use of appropriate tools to support digital transformation are potentially applicable to any organization, regardless of sector.

Figure 1 illustrates the alignment of the six dimensions of digital maturity with activities associated with users, enablers and operations delivering digital government.

**Figure 1 – Delivering digital government**

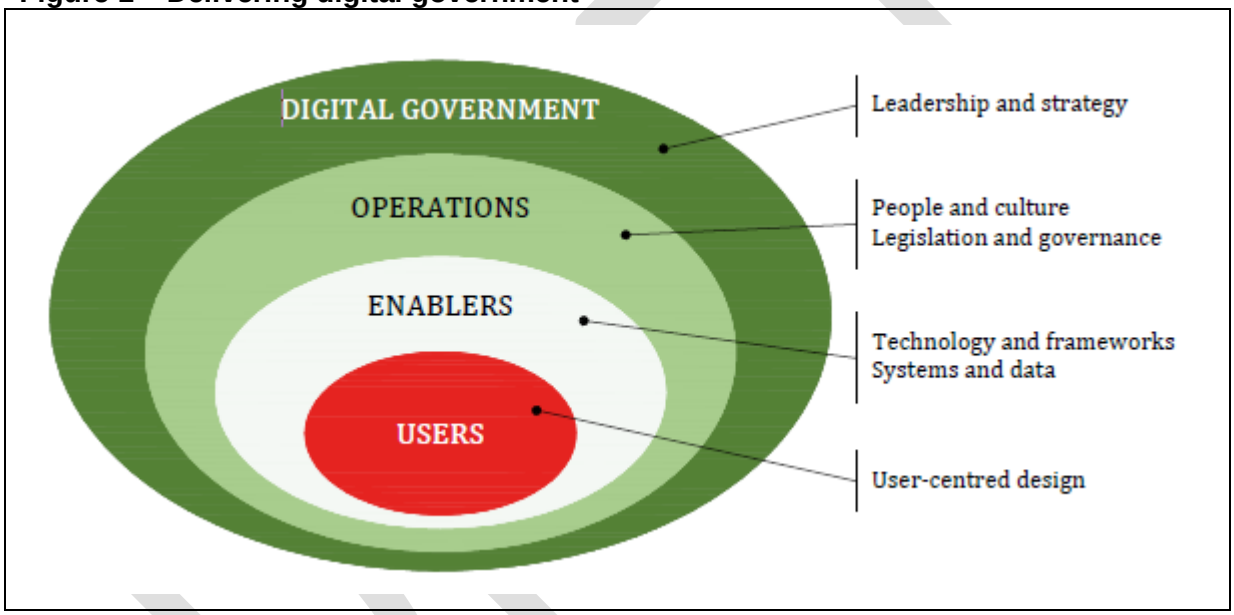


Table 2 outlines the scope of each dimension of digital maturity in government organizations and indicates where more detailed information are be found in later subclauses of this PAS.

**Table 2 – Scope of digital maturity in government organizations**

| Dimension | Description | Subclause number |
|---|---|---|
| Leadership and strategy, including:<br>• vision for effective operational use of data and digital technologies;<br>• strategic alignment with organizational goals; and<br>• resource allocation and funding commitment. | Leaders at all levels of government are the stewards of digital transformation in the development and delivery of public services.<br>Leaders set appropriate strategic objectives for digital government, oversee the coherent use of technology across policy areas and levels of government, and strengthen capacities to support better implementation of digital government strategies. | 4.2.2 |
| People and culture, including:<br>• personal skills;<br>• team capacity, change management and knowledge-sharing processes; and<br>• organizational training and workforce development, recruitment and decision-making processes. | Individuals and teams are at the heart of how government organizations develop and deliver public services.<br>People's attitudes, behaviours, capabilities, collaboration, decisions, innovation and learning determine the success of digital government strategies and their impact on citizens, businesses and civil society.<br>Data and digital technologies are both developed by and help to develop people in all these influential characteristics. | 4.2.3 |
| Legislation and governance, including:<br>• regulatory and governance frameworks;<br>• compliance with standards, guidelines, and international and inter-departmental protocols; and<br>• service definitions, contracts and partnership agreements. | Government organizations develop and implement legislation that governs public services and the operation of departments, agencies, public programmes and service providers.<br>The breadth of legislative and governance frameworks covers all aspects of public services, and inter-governmental and inter-departmental activities.<br>Measures are applied to protect the interests of the public and individuals, including a nationwide technology-based risk register, with thorough risk assessment of emerging technologies, evolving cybercrime risks to people, and enforced regulations and controls using enablers such as government accelerators. | 4.2.4 |
| Technology and frameworks, including: | Data and digital technologies are the building blocks of effective and efficient government business and public services. These technologies should integrate with existing | 4.2.5 |

**Table 2 – Scope of digital maturity in government organizations**

| Dimension | Description | Subclause number |
|---|---|---|
| • infrastructure, hardware, software and services;<br>• integration with services, remote working and operational functions; and<br>• risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies. | activities and operations or drive the digital transformation of government organizations to achieve step-changes in performance.<br>The security of data is assured by appropriate technologies and frameworks, as well as by the behaviours of people and services using them. | |
| Systems and data, including:<br>• enterprise and data architecture, cloud systems, data transfer systems and application programming interface (API) ecosystem management;<br>• data management, data quality, data verification and trust, and data maturity; and<br>• data asset management, data-driven and data-enabled services. | Data and the systems that store data are the basis for evidence-based, real-time decision-making in government and service delivery.<br>Designing and testing the processes of data acquisition, verification, storage, analysis, sharing and application for quality assurance purposes.<br>Transactions and engagement between organizations [business-to-business (B2B)] and between organizations and citizens [business-to-customer (B2C), in both directions] are dependent on trust in these processes.<br>This dimension of digital maturity also takes into account systems and data classes specific to some government departments and authorities. | 4.2.6 |
| User-centred design (UCD), including:<br>• service innovation and design standards;<br>• openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and<br>• development and use of digital identity. | UCD fully recognizes the requirements of all users of government systems and services in the development of public services, and of government business.<br>It facilitates user input to the design of services, promoting enhanced innovation, assurance and trust, and takes into account the needs and capacities of different user groups in the design process. | 4.2.7 |

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this PAS, the following terms and definitions apply.

### 3.1 digital government

use of digital technologies to provide public services to citizens and other persons in a country or region

*NOTE Various terminologies are used to describe some or all aspects of digital government. Examples include "e-government", "GovTech", "data government", "smart government", "electronic government", "online government", "Government as a Platform (GaaP)" and "connected government".*

### 3.2 digital maturity

measure of the readiness of an organization to use digital technologies (and associated enablers) through its operational processes to monitor its progress and ultimately to achieve its objectives

### 3.3 digital maturity assessment tool

formalized tool for assessing digital maturity in respect of defined organizational aspects and objectives

### 3.4 digital strategy

plan or approach which sets out how an organization will use data and digital technologies to achieve its organizational goals

### 3.5 digital technology

electronic device, hardware, software or service that uses digital information when performing a function

*NOTE Also referred to as "technology" or "data and digital technology".*

### 3.6 digital transformation

strategic implementation of digital technologies across an organization to deliver its digital strategy

### 3.7 government organization

department, agency, team or contractor organization providing government services to citizens, businesses, civil society or other government departments

### 3.8 leader

individual with responsibility and/or accountability to enable an organization to establish and/or achieve its organizational goals

### 3.9 user-centred design (UCD)

processes that focus on the requirements of all users (those in government and the businesses and citizens served) in the development of digital government systems and services

*NOTE Users have a broad range of characteristics (e.g. gender, disability, age, ethnic or language minority), with diverse needs and opportunities to access digital services according to their situation.*

## 4 Characteristics of digital maturity

### 4.1 General

This clause introduces a framework of characteristics of digital maturity relevant to government organizations and other organizations that use digital technologies.

*NOTE As with all organizations, government organizations have processes that are designed to achieve objectives. The nature of these processes differs according to the scope of services that are to be delivered, such as public works programmes and projects, and the internal activities necessary to deliver them. All of a government organization's operational processes in the service of achieving its objectives are important aspects or components of a purposeful ecosystem and can be viewed holistically.*

Table 3 indicates some characteristics of organizations with weak and strong digital maturity. Organizations should assess their digital maturity in each dimension to identify both opportunities for improvement and the nature of digital technologies that could be appropriate.

**Table 3 – Characteristics of digital maturity in government organizations**

| Dimension | Weak digital maturity | Strong digital maturity |
|---|---|---|
| Leadership and strategy | • Lack of digital strategy or roadmap<br>• Short-term plans<br>• Roles and responsibilities for digital technology not defined<br>• No defined budget or return on investment for digital transformation<br>• Poor prioritization of digital initiatives and projects<br>• Lack of awareness of the potential benefits of digital technologies<br>• Only some parts of the organization providing input<br>• Leaders not involved in the design stages<br>• Lack of political support<br>• No ongoing review or monitoring of plans | • Digital transformation strategy with long-term perspective and alignment with overall organizational goals and strategy<br>• Clarity on roles and responsibilities, including identified individuals<br>• Digital transformation fully budgeted and prioritized within strategy, with clear targets for return on investment<br>• Benefits of digital technologies clearly communicated throughout the organization<br>• Input and involvement from across the organization, users and external partners<br>• Leaders involved in the design stages<br>• Political support for digital transformation<br>• Ongoing review and monitoring of performance and progress |
| People and culture | • No encouragement for employees and contractors to innovate<br>• No digital champions or role models identified and supported in the organization<br>• Digital skills and training not prioritized<br>• Few, if any, learning and development opportunities | • Employees are encouraged to experiment with new digital technologies as part of a learning journey<br>• Digital champions identified and supported across the organization, and representative of the diversity of the workforce and users<br>• Effective learning and development policies and |

**Table 3 – Characteristics of digital maturity in government organizations**

| Dimension | Weak digital maturity | Strong digital maturity |
|---|---|---|
| | • Digital literacy not prioritized<br>• Recruiters do not take into account candidates' experience of digital technologies<br>• Few, if any, individuals hold knowledge or experience of digital technologies | practices in place, following national and international good practice, with a focus on developing digital skills and digital literacy<br>• Recruiters seek to hire candidates who are literate in digital technologies<br>• Strong knowledge-sharing processes across the organization in relation to digital skills and digital technologies |
| Legislation and governance | • Policies and legislation not updated to reflect digital government<br>• Frameworks and standards not applied consistently across government<br>• No procurement processes in place<br>• No assessment or monitoring of digital maturity of contractors<br>• Weak data security processes | • Policies, legislation and frameworks established to support the adoption of digital technologies and external partnerships<br>• Alignment with national and international standards governing the adoption, use and optimization of digital technologies<br>• Procurement processes in place to support decision-making and investment in digital technology<br>• Commitment to robust and secure data governance and security, including ethical considerations<br>• Assessment and management of risks associated with digital technology, including business continuity, incident response and disaster recovery |
| Technology and frameworks | • Lack of resources and budgets to support the use of technology<br>• Teams do not have access to appropriate hardware, software and services to perform roles and responsibilities<br>• Lack of awareness of which digital technologies are relevant<br>• Weak business continuity, incident response and disaster recovery plans, processes and controls | • Resources and budgets in place to support the use of technology<br>• Teams have access to infrastructure, hardware, software and services required to perform roles and responsibilities<br>• Support readily available to make good use of digital technologies<br>• Trialling new digital technologies to allow early adoption and continuous improvement in performance<br>• Robust business continuity, incident response and disaster |

**Table 3 – Characteristics of digital maturity in government organizations**

| Dimension | Weak digital maturity | Strong digital maturity |
|---|---|---|
| | • Lack of cybersecurity policies, plans, processes and controls, with unacceptable risk of a data security breach and key areas not covered (e.g. remote working, access control, device management) | recovery plans, processes and controls in place<br>• Effective cybersecurity policies, plans, processes and controls in place covering key areas (e.g. remote working, access control, device management) |
| Systems and data | • Poor leadership of and access to technical support, leading to system downtime and lack of integration across systems<br>• Poor or little use of data, requiring manual processes and services<br>• Little or no availability of real-time data<br>• Little or no use of dashboards and data visualization<br>• Data management approach and policies poorly, or not, defined, reducing the ability to share data within and outside the organization | • Robust enterprise and data architecture, with evidence of technical leadership and appropriate support structures in place<br>• Service level agreements and evidence of measuring and monitoring the performance of systems<br>• Integrated systems<br>• Data-driven decision-making and data-driven services through access to real-time data<br>• Effective use of dashboards and data visualization<br>• API ecosystem supported and encouraged<br>• Commitment to open data, with appropriate data-sharing policies and processes embedded across the organization |
| UCD | • User needs not included in the design and delivery of digital services<br>• Little or no evidence of engagement or communication with users<br>• Accessibility (physical and virtual) requirements not taken into account<br>• Reactive, inconsistent design processes<br>• No adoption of relevant standards<br>• Services delivered in silos | • Design and delivery of digital services fully responsive to all user needs<br>• Users involved in service design, with effective channels for communication with, and feedback from, users<br>• Proactive adherence to relevant good practice and regulations<br>• Use of design standards and design thinking to address complexity in services and develop cross-functional, holistic solutions<br>• High uptake of digital services and high levels of digital inclusion |

**Table 3 – Characteristics of digital maturity in government organizations**

| Dimension | Weak digital maturity | Strong digital maturity |
|---|---|---|
| | • Poor access to digital services and low levels of digital inclusion | |

### 4.2 Implementing digital maturity

#### 4.2.1 General

Organizations should undertake an assessment of their maturity in each dimension to understand their readiness to adopt digital technologies and identify potential improvements.

#### 4.2.2 Leadership and strategy

Leaders at all levels of government are the stewards of digital transformation in the development and delivery of public services. Leaders should set appropriate strategic objectives for digital government, oversee the coherent use of technology across policy areas and levels of government, and strengthen capacities to support better implementation of digital government strategies. To strengthen leadership and develop effective strategies for digital transformation, government organizations should take account of the following aspects.

a) A vision for effective operational use of data and digital technologies, for example by:
   1) appointing senior decision makers and/or non-executives with relevant experience in using data and digital technologies;
   2) involving leaders from across government and users (employees, businesses, civil society and citizens) in the design stage of digital transformation;
   3) undertaking regular risk analysis, establishing crisis management procedures and staff training, and holding simulation exercises;
   4) engaging, motivating, building commitment and mobilizing leaders and resources at all levels for the successful implementation of a digital strategy and associated sub-strategies; and
   5) taking into account the societal impact of digital initiatives, evaluating potential risks and unintended consequences, and proactively addressing concerns and negative impacts.

b) Strategic alignment with overall organizational goals and strategy, for example by:
   1) providing ongoing endorsement and support for digital transformation from the top of the organization and involving leaders from across government, aligned with national and departmental priorities;
   2) shaping plans to achieve organizational goals that are consistent with a digital strategy, including plans for communication to stakeholders and ongoing review and monitoring of progress against defined measures of success;
   3) sharing information about the benefits of digital transformation with relevant people in all government departments and agencies; and
   4) reducing implementation barriers and incentivizing internal and external collaboration and partnerships.

c) Resource allocation and funding commitment, for example by:
   1) taking a long-term, sustainable perspective;
   2) defining essential roles and responsibilities for action;
   3) budgeting with fully defined and prioritized tasks and objectives; and

4) reviewing and optimizing types of spend, such as capital expenditure and operational expenditure.

### 4.2.3 People and culture

Individuals and teams are at the heart of how government organizations develop and deliver public services. Therefore, their attitudes, behaviours, capabilities, collaboration, decisions, innovation and learning determine the success of digital government strategies that impact on citizens, businesses and civil society. Data and digital technologies are both developed by and help to develop people in all these influential characteristics. To develop personal capabilities and establish an appropriate culture for digital transformation, government organizations should take into account the following factors.

a) Personal skills, for example by:

1) seeking to recruit people who have an understanding and experience of digital technologies, and are willing to continue to develop their digital capabilities;

2) encouraging a digital mindset in individuals encompassing a wide range of technical and non-technical skills and capabilities; and

3) designing personal development as a continuous, learning journey towards long-term digital capability.

b) Team capacity, change management and knowledge-sharing processes, for example by:

1) creating an environment that encourages innovation and experimenting with digital technologies;

2) removing barriers and allocating resources and budget to enable experimentation with new digital technologies, increase digital maturity, and empower employees to look for further improvements and opportunities;

3) identifying digital champions, representative of the diversity of the workforce and users, and enabling them to promote innovation from within their organizations;

4) creating a culture that encourages mentoring and coaching;

5) implementing an agile approach to proof-of-concepts, pilots and projects to enable new technologies to be introduced at an early stage and without fear of failure; and

6) recognizing digital transformation as a non-linear learning journey.

c) Organizational training and workforce development, recruitment, and decision-making processes, for example by:

1) investing systematically and consistently across the organization in digital skills, training and personal development;

2) implementing a planned model for building and organizing digital skills, training and personal development;

3) aligning the recruitment approach with the private sector to maximize interest (e.g. role descriptions, learning and development and career pathways);

4) supporting cross-functional and cross-department collaboration, and developing internal metrics that are consistent and aligned with objectives; and

5) developing strong knowledge-sharing processes across teams and departments in relation to digital skills and digital technologies.

### 4.2.4 Legislation and governance

Government organizations develop and implement legislation that governs public services and the operation of departments, agencies, public programmes and service providers. The breadth of legislative and governance frameworks covers all aspects of public services, and

inter-governmental and inter-departmental activities. To achieve digital transformation in legislation and governance, government organizations should take into account the following aspects.

a) Regulatory and governance frameworks, for example by:

   1) developing robust internal policies and assurance processes for the use of digital technologies, cybersecurity, risk management, and crimes relating to online technology (e.g. child exploitation);

   2) sponsoring the development of and adopting appropriate standards for digital government, aligned with topic-specific national and international standards;

   3) including effective requirements for data protection;

   4) stimulating investment in digital skills and capabilities;

   5) encouraging investment, co-investment and partnership in digital transformation by businesses;

   6) implementing effective policies for sustainable governance;

   7) assessing and managing risk effectively, including business continuity, incident response and disaster recovery;

   8) integrating ethical considerations within governance structures and decision-making processes (e.g. by encouraging the adoption of trustworthy digital technologies with high ethical standards that are subject to independent review);

   9) supporting the implementation of digital identities and associated applications; and

   10) assisting compliance with international agreements and laws, as well as other forms of international cooperation.

b) Service definitions, contracts and partnership agreements, for example by:

   1) implementing effective frameworks for supplier management and working with private sector organizations;

   2) encouraging inter-governmental and inter-departmental collaboration and co-ordination;

   3) establishing procurement processes to support decision-making and investment in digital technology; and

   4) setting appropriate standards of security in data storage and data sharing.

#### 4.2.5 Technology and frameworks

Data and digital technologies are the building blocks of effective and efficient government business and public services. These technologies should be integrated with existing activities and operations, or drive the digital transformation of government organizations to achieve step-changes in performance. The scope of data and digital technologies available are wide ranging, as indicated in Table 1. To make good use of available and emerging data and digital technologies, government organizations should take into account the following aspects.

a) Infrastructure, hardware, software and services, for example by:

   1) maintaining adequate budgets for resources over the long term;

   2) regularly conducting horizon-scanning processes to remain aware of potential new technologies or threats, and planning for the retirement of aging technologies; and

   3) continuously looking for emerging technologies that have the potential to be effective in delivering government objectives and seeking case study evidence.

b) Integration with services, remote working and operational functions, for example by:

1) providing individuals and teams with access to infrastructure, hardware, software and services required to perform their roles;
2) making appropriate use of, and supporting and managing, third-party-owned and personal devices; and
3) making IT and other support readily available.

c) Risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies, for example by:
1) trialling new digital technologies to allow early adoption and continuous improvement of performance;
2) putting in place robust business continuity, incident response and disaster recovery plans, processes and controls; and
3) establishing and implementing effective cybersecurity policies, plans, processes and controls using appropriate technologies (in relation, for example, to remote working, access controls, firewalls, authentication, device management, patch management, data back-ups).

#### 4.2.6 Systems and data

Data and the systems that store data are the basis for evidence-based, real-time decision-making in government and service delivery. The processes of data acquisition, verification, storage, analysis, sharing and application should be carefully designed and tested.

*NOTE Transactions and engagement between organizations (B2B) and between organizations and citizens (B2C, in both directions) are dependent on trust in these processes.*

The security of data is increasingly important for all organizations, and with more services being made available online, sensitive information should be protected by increasing security mechanisms and managing the behaviours of system users. To provide effective systems and data processes for digital transformation, government organizations should take into account the following aspects.

a) Enterprise and data architecture, cloud systems and data transfer systems, for example by:
1) designing an appropriate enterprise and data architecture that defines technical roles and responsibilities, support for IT systems, service level agreements, and processes for measuring and monitoring system performance;
2) using an API ecosystem for efficient data transfer, including appropriate policies, processes and standards; and
3) identifying opportunities to streamline, integrate systems, replicate systems and reduce the enterprise and data architecture complexity.

b) Data management, data quality, data verification and trust, and data maturity, for example by:
1) evaluating the cost and benefit of maintaining legacy systems and associated processes versus the investment required to change;
2) aligning data collected and measured with strategic government priorities;
3) putting in place effective cybersecurity policies, plans, processes and controls;
4) recognizing that data protection should not be limited to data systems and could include people, places and other assets; and
5) using algorithms that are unbiased, explainable and accountable, with processes established to monitor for potential bias or discrimination.

c) Data asset management, data-driven and data-enabled services, for example by:

1) managing data as an asset of the organization;

2) developing new services enabled by the data acquired through digital government;

3) encouraging continuous innovation in digital government, as well as with citizens, businesses and civil society, through adopting policies and practices that enable open data and sharing data; and

4) encouraging access to real-time data, and the use of dashboards and data visualization.

**4.2.7 UCD**

The needs of all users of government systems and services should be fully recognized in the development and design of government systems and services.

*NOTE The involvement of users promotes enhanced innovation, assurance and trust.*

To incorporate UCD effectively in digital transformation, government organizations should take into account the following aspects.

a) Service innovation and design standards, for example by:

1) defining the purpose and role of UCD in areas such as data-driven decision-making, navigating and resolving complexity and enabling multi-disciplinary teams;

2) putting in place appropriate policies and processes for accessibility and the UCD process (e.g. physical and virtual access, and providing services that cater to all user needs);

3) focusing on the quality not just quantity of outputs; and

4) enabling inclusive and accessible, user-centred, next-generation services.

b) Openness, transparency, inclusiveness, accessibility, engagement, user feedback, participation and communication, for example by:

1) seeking to overcome organizational silos to promote collaborative, end-to-end delivery and holistic solutions;

2) defining the nature of all users of digital government processes and services who are involved in UCD, including employees of government organizations, citizens, businesses and civil society;

3) promoting and actively enabling UCD through the active involvement of users in service design, and providing effective access, and dialogue and feedback channels, including recognizing successes and learning from experience;

4) encouraging participation, testing and feedback from a broad range of users;

5) providing accountability and feedback loops to users, such as complaints mechanisms;

6) being proactive by keeping users informed;

7) encouraging digital literacy, uptake of digital services and overall digital inclusion;

8) providing online tools to enable effective access to and participation in UCD (e.g. through e-participation, user surveys); and

9) providing collaboration structures to support UCD (e.g. spend control mechanisms, central digital teams, communities of practice, and sector and co-ordination bodies).

c) Development and use of digital identity, for example by:

1) researching and building knowledge of the needs of all users, and the nature of barriers to using digital government services;

2) understanding the digital literacy of citizens, businesses and civil society;
3) understanding and taking into account the needs and capacities of different user groups during the design process;
4) building user trust in sharing data, through targeted training and communication;
5) making government documents and appropriate data available in digital form; and
6) taking into account the role of the private sector to support the creation of a trust model.

### 4.3 Evidence of digital maturity

Organizations should gather evidence to support their assessment of digital maturity in each dimension. Table 4 provides examples of the ways in which organizations might prepare for digital transformation, including research, collaboration, planning and organizational processes.

**Table 4 – Evidence of preparing for digital transformation**

| Dimension | Methods/Examples |
|---|---|
| Leadership and strategy | • Studying data and digital technologies use cases<br>• Learning from peers and sharing good practice for use of data and digital technologies<br>• Proactively engaging leadership in the development of a digital strategy and digital transformation<br>• Defining roles and responsibilities for digital transformation (including job descriptions, resources and budgets)<br>• Incorporating metrics, measuring performance, and monitoring return on investment from data and digital technologies<br>• Monitoring the sustainability of digital investments<br>• Formalizing organizational strategy, planning and business case processes, including investments in data and digital technologies<br>• Horizon scanning for digital technologies<br>• Investing in data and digital technologies across the organization<br>• Collaborating across functions, including the use of data and digital technologies<br>• Communicating organizational strategy, including digital strategy<br>• Political support for digital transformation, evidenced by national or department-level strategies |
| People and culture | • Empowering the workforce to use data and digital technologies<br>• Enabling the workforce to work more efficiently<br>• Managing workforce performance objectively using data and digital technologies<br>• Communicating key performance information using data and digital technologies |

**Table 4 – Evidence of preparing for digital transformation**

| Dimension | Methods/Examples |
|---|---|
| | • Agreeing personal development objectives, including digital skills and training<br>• Recognizing and supporting digital champions<br>• Recruiting and training to address skills gaps and increase diversity<br>• Investing in training in digital skills<br>• Promoting knowledge sharing of digital skills and digital technologies<br>• Removing barriers and permitting experimentation with data and digital technologies<br>• Being agile in the use of digital technologies<br>• Embedding appropriate processes and policies across the organization for the use of data and digital technologies<br>• Recognizing digital transformation as a non-linear learning journey |
| Legislation and governance | • Developing and publishing national standards and frameworks to support the use of data and digital technologies<br>• Implementing audit and assurance processes and requirements to support the use of data and digital technologies<br>• Using digital technologies to support collaboration<br>• Collaborating with suppliers, customers and other partners for successful integration of digital technologies<br>• Putting partnership agreements in place to invest and/or co-invest in data and digital technologies<br>• Evaluating the business case for new delivery models, including the use of data and digital technologies<br>• Complying with data regulations<br>• Adopting risk management frameworks to support the use of data and digital technologies<br>• Developing and implementing environmental, social and governance policies supported by data and digital technologies |
| Technology and frameworks | • Asset lists for data and digital technologies<br>• Software licences and subscription records<br>• User feedback on the use of data and digital technologies<br>• Developing roadmaps to test cross-organization appropriateness, alignment, and phasing of data and digital technologies<br>• Taking account of the obsolescence of technology<br>• Developing new delivery models enabled by digital technologies |

**Table 4 – Evidence of preparing for digital transformation**

| Dimension | Methods/Examples |
|---|---|
| | • Developing and implementing cybersecurity and risk management policies<br>• Clearly defining roles and responsibilities (e.g. job descriptions and budgets) to support data and digital technologies<br>• Extending protection beyond data (e.g. people, places and assets)<br>• Communicating policies and expectations (e.g. end-user guidelines) for the use of data and digital technologies |
| Systems and data | • Providing effective IT systems support for operational improvements<br>• Integrating digital features into products and services<br>• Verifying secure and efficient data transfer<br>• Implementing an API ecosystem and associated policies and management systems<br>• Putting service level agreements in place for data and digital technologies<br>• Capturing and monitoring system performance data<br>• Allocating technical roles and responsibilities within the department (e.g. technical architects and product managers)<br>• Clearly defining and documenting enterprise and data architecture and operational frameworks<br>• Managing data as an organizational asset<br>• Adopting a strategic commitment to open data<br>• Enabling access to government data (e.g. data marketplaces)<br>• Accessing real-time data to support decision-making<br>• Adopting dashboards and data visualization<br>• Implementing data-sharing policies and processes<br>• Adopting relevant national and international standards (e.g. data protection, cybersecurity and IT service management)<br>• Establishing a project management office to support digital transformation |
| UCD | • Accessing user feedback (e.g. e-participation, consultations, research and focus groups) regarding digital services<br>• Developing and publishing user experience research reports<br>• Testing usability of digital services<br>• Establishing clear communications with users about digital services<br>• Measuring client satisfaction in relation to digital services<br>• Integrating digital services |

**Table 4 – Evidence of preparing for digital transformation**

| Dimension | Methods/Examples |
|---|---|
| | • Developing and implementing guidelines, policies and processes (e.g. Digital First, Digital by Default and co-creation guidelines)<br>• Establishing structures and processes to improve collaboration in the use of data and digital technologies (e.g. communities of practice, sector bodies, central digital teams and user-centric data commissions)<br>• Adopting relevant national and international standards (e.g. on accessibility) to support the use of data and digital technologies and the delivery of digital services |

## 5 Measuring digital maturity

### 5.1 General

This clause sets out recommendations on how to measure maturity in optimizing the use of digital technologies for government business and public services. A summary of recommendations is presented in Table 5.

**Table 5 – Summary of recommendations for measuring digital maturity**

| Recommendation | Description |
|---|---|
| Using all available evidence of digital maturity | • Identifying and using appropriate sources of evidence, including objective data and subjective information<br>• Gathering user experience feedback from internal departments, citizens, businesses and civil society<br>• Benchmarking digital maturity between government organizations – regionally, nationally and internationally |
| Developing digital maturity through learning journeys | • Recognizing the non-linear nature of digital systems, processes and the development of capabilities<br>• Designing training and development pathways to digital maturity as learning journeys |
| Differentiating digital maturity by roles and responsibilities | • Recognizing that digital maturity might depend on individual roles and responsibilities |
| Interpreting digital maturity consistently | • Choosing consistent standards so that digital maturity can be interpreted consistently within a government organization and between engaged organizations |
| Managing uncertainty in estimating digital maturity | • Identifying objective and subjective sources of evidence of digital maturity<br>• Verifying the accuracy and consistency of estimates of digital maturity using alternative sources and measurement methods<br>• Validating estimates of digital maturity in the context of decisions to be made using the information<br>• Verifying the accuracy of the measurement of data<br>• Understanding the extent of unmeasured performance |

**Table 5 – Summary of recommendations for measuring digital maturity**

| Recommendation | Description |
|---|---|
| | • Appreciating limitations in the experience of personnel<br>• Identifying the potential for unintentional biases |

### 5.2 Digital maturity measurement scales

Examples of potential measurement scales are shown in Table 6.

**Table 6 – Examples of digital maturity measurement scales**

| Digital maturity measurement scale | Least ◄ | | | | ► Greatest |
|---|---|---|---|---|---|
| Qualitative rating of digital maturity based on scoring system | Very low | Low | Medium | High | Very high |
| Percentage of defined target measure of digital maturity | 0%–20% | 20%–40% | 40%–60% | 60%–80% | 80%–100% |
| Numerical measure of digital maturity | 1 | 2 | 3 | 4 | 5 |

### 5.3 Using all available evidence of digital maturity

Table 7 provides examples of sources of subjective and objective evidence that should be taken into account and combined in measuring digital maturity. Multiple sources, as far as is reasonably practicable, should be used when estimating and monitoring digital maturity.

*NOTE Subjective evidence refers to information based on personal experience, assumptions, opinions or beliefs; objective evidence is information based on direct measurement or observation of relevant indicators.*

**Table 7 – Examples of subjective and objective evidence of digital maturity**

| Subjective evidence | Objective evidence |
|---|---|
| • Employee satisfaction rating<br>• Customer satisfaction rating<br>• User experience feedback<br>• Peer judgements, such as endorsements, citations and awards<br>• Delivery of organizational strategies, plans and business cases for digital transformation<br>• Progress in a digital transformation training and development plan | • User experience data (e.g. complaints, service requests)<br>• Service level key output and outcome performance indicators directly related to digital maturity<br>• Performance compared with large datasets, establishing regional, national or international benchmarks<br>• Compliance with appropriate and recognized national and international standards for aspects of digital maturity, such as cyber risk and resilience |

### 5.4 Developing digital maturity through learning journeys

A learning journey is a personal development process which recognizes that transformation of any kind is typically non-linear. Agile project management is one example of how this concept is applicable across many organizations. Major software vendors design their user training programmes as learning journeys for groups of business leaders.

Government organizations should take into account delivering digital transformation as a learning journey tailored to the needs of individuals and teams. Key factors include:

a) building in formal periods of reflection where individual experiences are reviewed and used to re-develop the journeys of the wider team;

b) making decisions iteratively as opposed to prematurely, allowing for emerging opportunities to be recognized and unplanned solutions tested; and

c) demonstrating leadership commitment to the learning journey approach, which includes tolerance of reworking or revisiting solutions in ways that might be perceived as failure in a traditional sense.

### 5.5 Differentiating digital maturity by roles and responsibilities

Government organizations should take into account setting targets for digital maturity, recognizing that the optimum level of digital maturity for the individual varies according to their role and responsibilities in the organization, and the wider context of digital transformation.

### 5.6 Interpreting digital maturity consistently

Government organizations working with other organizations should take into account how to interpret digital maturity appropriately, by:

a) choosing diagnostic tools, frameworks and models for digital maturity assessment that are consistent between participating organizations;

b) prioritizing dimensions and aspects of digital maturity that are most appropriate to their common requirements;

c) adopting a consistent scale to support efficient read-across and comparison of digital maturity; and

d) monitoring digital maturity at key nodes or levels of the system of influences on overall performance, e.g. at the level of individual, team, department and inter-departmental processes.

When using digital maturity assessment tools with different scales of measurement, each organization should translate the assessment outputs into a common scale for ease of comparison.

### 5.7 Managing uncertainty in estimating digital maturity

*NOTE Uncertainty is a factor in the diagnosis of digital maturity in government organizations, as with any evidence relied on in a strategic decision.*

To verify that their assessment of digital maturity is robust, government organizations should:

a) identify objective and subjective sources of evidence of digital maturity;

b) verify the accuracy and consistency of estimates of digital maturity using alternative sources and measurement methods to maximize reliability and trust;

c) validate estimates of digital maturity in the context of decisions to be made using the information;

d) take into account the breadth and depth of experience of personnel in the use of digital technologies, as well as individuals' limitations;

e) take into account the organizational context into which the digital technologies are to be integrated;

f) address the extent of organizational process performance that goes unmeasured, by intent or by omission, as a result of gaps in knowledge, e.g. by seeking external support, upskilling employees and recruitment;

g) take into account knowledge, experience and perspectives from other organizations and how they measure digital maturity;

h) address the potential for optimism bias in estimating digital maturity, especially by those directly responsible for the organizational processes in question; and

i) address the potential for pessimism bias in estimating digital maturity, especially by those who might be blockers of innovation with digital technologies.

## 6 Selecting and using digital maturity assessment tools

### 6.1 General

This clause sets out factors for organizations to take into account when selecting and using digital maturity assessment tools.

### 6.2 Selecting digital maturity assessment tools

A summary of recommendations for selecting a digital maturity assessment tool is presented in Table 8. Annex C lists several digital maturity assessment tools that have been developed with the support of national and international organizations.

**Table 8 – Summary of recommendations for selecting digital maturity assessment tools**

| Attribute | Recommendation |
|---|---|
| Appropriateness of digital maturity assessment tools to meet organizational and user needs | • Selecting a tool appropriate to meet the needs of the organization and all users |
| Compatibility between digital maturity assessment tools | • When two or more tools are used, selecting those that are compatible |
| Data and information security | • Adopting appropriate information security standards |
| Digital maturity assessment tool parameters | • Stage based<br>• Enabler based |
| Application | • Whole of government<br>• Specific department or government function<br>• Sector specific<br>• Country specific |
| Drivers | • Managing and assessing digital transformation risks<br>• Economic development<br>• Demonstrating alignment with UN Sustainable Development Goals |

**Table 8 – Summary of recommendations for selecting digital maturity assessment tools**

| Attribute | Recommendation |
|---|---|
| Availability of benchmark data | • Benchmarking performance at a national level<br>• Benchmarking performance at a departmental level |

### 6.3 Appropriateness of digital maturity assessment tools to meet needs

*NOTE 1 Different digital maturity assessment tools are available for a range of purposes relevant to organizations. Each of these tools has its own scale of digital maturity and its own measurement system. Such tools are often specialized in terms of the aspects of organizations they are intended to examine (e.g. government organizations).*

Organizations should select digital maturity assessment tools that are appropriate to their evolving objectives. This should include the needs of the organization and all its users.

*NOTE 2 Tools focused on different aspects of organizations may be required at different times to support the overall strategy of the organization for driving value from digital technologies, and aspect-specific needs of the organization.*

*NOTE 3 Annex D provides guidance on specific considerations to measure the digital maturity of a specific government ministry or department.*

### 6.4 Compatibility between digital maturity assessment tools

When it is necessary to use more than one digital maturity assessment tool to improve clarity across the organization and/or in multiple aspects, an organization should assess the compatibility of the tools in terms of:

a) styles of data entry and reporting;

b) management of a single source of data, and avoidance of double entry of data;

c) consistency of definitions of organizational aspects and associated digital maturity;

d) ability to read across the digital maturity assessment with different tools; and

e) consistency of processes, algorithms and measurement of digital maturity.

### 6.5 Data and information security

Information security management should take into account the selection and use of a digital maturity assessment tool when data are to be stored on an organization's systems internally (e.g. between employees and the organization) and/or externally (e.g. between the organization and a third-party delivery partner).

*NOTE Insecure storage, transmission, processing or use of data and information might have various consequences, including loss of intellectual property, interference with organizational processes, loss of personal data, and financial, economic or reputational harm to the organization and/or its customers.*

### 6.6 Digital maturity assessment tool parameters

Digital maturity assessment tools should be employed to enable organizations to assess and improve their performance across several different variables.

*NOTE Digital maturity assessment tools have widely different frameworks, as indicated in Annex C. Stage-based maturity models provide a linear framework against which an organization might establish its current and desired state. Such a framework might also include steps and actions which support effective adoption of data and digital technologies in a given area. Enabler-based models take into account actions and change catalysts across multiple areas in the organization. They help an organization to identify underlying structures and activities (e.g. leadership and governance) which might accelerate digital maturity.*

### 6.7 Application

*NOTE 1 Digital maturity assessment tools are available to support many different uses.*

An organization should select a digital maturity assessment tool that best aligns with its purposes.

*NOTE 2 The desired outcome could be, for example, to improve the digital maturity of a specific department, or to enable improvement across government.*

*NOTE 3 Some digital maturity assessment tools have been developed to support specific needs, such as to assess and accelerate digital maturity within a specific sector of the economy; or to facilitate digital government ambitions within a specific country.*

### 6.8 Drivers

Digital maturity assessment tools should be used to support different objectives. These might include risk management (supporting organizations to manage and assess the risks associated with digital transformation), economic development and alignment with national and international standards, performance metrics and other objectives.

For example, digital transformation is an important enabler to help organizations align with and achieve several UN SDGs. Organizations might use digital maturity assessment tools to measure their progress towards these objectives.

### 6.9 Availability of benchmark data

*NOTE Some digital maturity assessment tools enable government departments to benchmark their current maturity and performance against their peers. Benchmarking might be helpful, enabling organizations to set targets and key performance indicators.*

Organizations should verify that reference data are accurate and valid for the intended purposes. Where benchmark data are gathered through self-assessment and have not been independently verified, particular care should be taken.

### 6.10 Using tools to measure digital maturity

Table 9 presents recommendations for using digital maturity assessment tools to identify weaknesses, strengths and potential digital solutions with examples of typical operational and service improvement challenges.

*NOTE The guidelines in this subclause are not intended to provide a complete methodology for planning or implementing digital technologies.*

**Table 9 – Recommendations for using digital maturity assessment tools**

| Recommendation | Examples of government outcome measures | Examples of department or agency outcome measures | Examples of citizen or business outcome measures |
|---|---|---|---|
| Appreciating potential to improve services | • Initializing a vision of what might be achieved with digital technologies<br>• Initializing discussion of potential benefits of digital transformation, and the influence of specific circumstances and external conditions | • Alignment with different user-centred priorities<br>• More efficient delivery of services | • Alignment with different user needs and user access opportunities<br>• Improved digital services |
| Developing the business case to support investments in new digital technology and digital services | • Clarity<br>• Vision<br>• Return on investment<br>• Horizon scanning | • Department-specific requirements<br>• Identification of skills and resource needs | • Alignment with user needs<br>• Define communications requirements |
| Identifying and responding to potential user-centred needs | • Investments aligned with user needs<br>• Improved service delivery and associated feedback<br>• Compliance with international standards | • Alignment with different user-centred priorities<br>• More efficient delivery of services<br>• Compliance with national and international standards | • Alignment with different user needs<br>• Improved digital services |

**Table 9 – Recommendations for using digital maturity assessment tools**

| Recommendation | Examples of government outcome measures | Examples of department or agency outcome measures | Examples of citizen or business outcome measures |
|---|---|---|---|
| Identifying legal and regulatory factors which might influence the adoption of digital technologies | • Establishing frameworks, policies and legislation to enable digital services<br>• Compliance with international standards | • Establishing policies and guidelines to support internal and external activities<br>• Compliance with national and international standards | • Clarity on requirements for effective collaboration and partnership<br>• Legal and regulatory assurance |
| Identifying system and data requirements to support digital services | • Establishing frameworks, policies and legislation to enable data sharing<br>• Compliance with international standards | • Establishing policies and guidelines to support internal and external activities<br>• Compliance with national and international standards | • Clarity on requirements for effective collaboration and partnership<br>• Data protection assurance |
| Understanding digital maturity and gaps to be addressed | • Measuring the difference between optimized use of digital technologies and actual digital maturity<br>• Identifying gaps to be addressed | | • Alignment with user needs<br>• Improved digital services |

**Table 9 – Recommendations for using digital maturity assessment tools**

| Recommendation | Examples of government outcome measures | Examples of department or agency outcome measures | Examples of citizen or business outcome measures |
|---|---|---|---|
| Identifying actions needed to address gaps | • Identifying actions to move towards optimized use of digital technologies<br>• Understanding dependencies between actions across the organization and between departments<br>• Clarifying the availability of funding and resources<br>• Understanding the optimum sequencing of activities<br>• Recognizing the need for targets for improved performance | | • Alignment with user needs<br>• Improved digital services |
| Setting targets for improved performance and service delivery | • Setting targets for each aspect influencing the business case<br>• Targeting optimized performance across the organization in the context of opportunities, costs of capability development and changes in operations, and benchmarks achieved by other organizations | | • Alignment with user needs<br>• Improved digital services |

### 6.11 Continuous improvement and monitoring progress towards targets

Organizations should keep track of progress towards achieving business case goals by monitoring digital maturity, taking into account:

a) the consistent use of chosen digital maturity assessment tools to track the progress of digital maturity over time;

b) learning from experience and maintaining focus on improvement objectives by repeating digital maturity assessments and tracking changes;

c) ready and secure access to digital maturity data by those responsible for actions relating to digital transformation;

d) monitoring the completion of actions and reducing gaps identified from previous digital maturity assessment tools;

e) monitoring progress towards achieving business case results; and

f) managing changes in priorities across the organization.

## Annex A (informative)
## Examples of digital technologies

Table A.1 indicates a range of technologies that might be appropriate for government organizations.

**Table A.1 – Examples of digital technologies**

| | |
|---|---|
| • Additive manufacturing/3D printing<br>• Apps<br>• Artificial intelligence<br>• Artificial intelligence security<br>• Augmented analytics<br>• Augmented reality<br>• Automated decision-making<br>• Autonomous vehicles<br>• Big data<br>• Blockchain and distributed ledger technologies<br>• Business management software[A)]<br>• Cloud computing<br>• Conversational platforms<br>• Data and data analytics<br>• Data as a product/service<br>• Data exchange platforms[B)]<br>• Data visualization<br>• Decentralized identity<br>• Digital signatures<br>• Digital twins<br>• Digital wallets<br>• Distributed cloud<br>• Drones<br>• E-commerce and digital marketplaces<br>• Edge computing<br>• Federated learning | • Internet of Things<br>• Machine learning<br>• Machine vision<br>• Mathematical modelling to support decision-making<br>• Mesh app and service architecture<br>• Metaverse<br>• Mixed reality<br>• Mobile devices<br>• Multimodal interaction<br>• Neuromorphic computing<br>• Quantum computing<br>• Personal computers<br>• Predictive analytics<br>• Productivity software[C)]<br>• Robotics and automation<br>• Sensors<br>• Simulation<br>• Single sign-on<br>• Smart spaces<br>• Virtual reality<br>• Voice over Internet Protocol<br>• Voice recognition<br>• Wearable technology<br>• Web 2.0<br>• Web3<br>• 5G and 6G |

[A)] For example, client relationship management, database management, project management, financial management, human resources management, stock management

[B)] For example, Government Services Bus in UAE (https://u.ae/en/information-and-services/g2g-services/government-services-bus)

[C)] For example, word processing, spreadsheets and email

**Annex B (informative)**
**Case studies**

This Annex illustrates some aspects of digital maturity for government organizations using publicly available case studies.

**Table B.1 – Case study: Transport for London, Open Data and Digital Partnership, United Kingdom**

| | |
|---|---|
| **Service provider** | Transport for London (TfL) is the UK capital's integrated transport authority responsible to the Mayor of London for meeting strategy and commitments on transport in London. TfL runs the day-to-day operation of London's public transport networks and main roads. TfL's aims include:<br>• providing travel information about London, wherever and whenever it is required by the user;<br>• facilitating the development of technology enterprises, small and medium-sized businesses, generating employment and wealth for London and beyond; and<br>• crowdsourcing innovation by having thousands of developers working on designing and building applications, services and tools with TfL data. |
| **Publication date** | 2007 |
| **Description** | TfL releases anonymized data for anyone to use, free of charge. Data is made available in static files, data feeds and APIs. Partner organizations develop new products and services using the data and provide them to members of the public.<br>Live and statistical data and information made available by TfL includes air quality measurements; general journey planning information; tube station departure boards and line status; bus, coach and river bus arrivals; road disruption and camera images; cycle routes and maps; walking routes; and information on accessibility and the location of toilet facilities. |
| **Use of data and digital technologies** | APIs for retrieval of live and statistical data and information. |
| **Benefits** | The benefits of TfL's open data approach were independently assessed in 2017 to be worth up to £130 million for travellers, London and TfL itself, including:<br>• saved time for network passengers and other road users;<br>• savings made from moving from SMS alerts;<br>• better information to plan journeys, travel more easily and take more journeys;<br>• gross value added to the London economy;<br>• high-value job creation in London, and wider job creation in the supply chain;<br>• savings to TfL from not having to produce apps in-house or invest in campaigns and systems relating to the data; and<br>• leveraging value and savings to TfL from partnerships, including data received back from them. |

| | |
|---|---|
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals; and resource allocation and funding commitment.<br><br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services. |
| **More information** | https://tfl.gov.uk/info-for/open-data-users/open-data-policy<br><br>https://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf |

**Table B.2 – Case study: UAE Verify and UAE API Marketplace, UAE**

| | |
|---|---|
| **Service provider** | TDRA is the statutory body responsible for the regulation of the telecommunications sector in the UAE. Its key responsibilities and functions include consumer protection, allocation of scarce resources (spectrum and numbers), interconnection of licensees' networks, and overseeing the use of approved telecommunications devices, licensing and competition safeguards. |
| **Publication date** | 2022 |
| **Description** | UAE Verify is a digital platform for helping government and private entities, and individuals, to verify the authenticity of digital documents issued by one of these entities or their partners. The UAE Verify platform and service provided by TDRA uses blockchain technology to help regulate data and digital documents, verifying their authenticity, sharing information and documents, and protecting privacy. UAE Verify's three stages of authentication are:<br>• **Acquire:** Document owners can request a Digital Trusted Document from the channels of participating government and private entities, or request it through the UAE PASS app;<br>• **Verify:** Recipients of a Digital Trusted Document can verify its authenticity, integrity and validity from the official source on UAE Verify by uploading the document or by scanning a QR code presented by the document owner through their UAE PASS app; and<br>• **Validate:** The UAE Verify platform checks the unique digital code or "hash" of the Digital Trusted Document registered on the document's blockchain to verify that the document comes from the official source and has not been tampered with. UAE Verify also provides real-time status of the document life cycle from the official source.<br>The UAE API Marketplace portal enables the UAE private sector to provide seamless services using APIs. |
| **Use of data and digital technologies** | • UAE PASS App;<br>• UAE PASS QR code; and<br>• cloud data platforms. |
| **Benefits** | Key benefits to citizen users of the UAE Verify service include data security, assurance provided by tamper-proof blockchain technology, and instant verification of documents originating from a participating entity.<br>The UAE API Marketplace portal allows private sector service providers to explore, try and subsequently integrate with the UAE Government APIs. |

**Table B.2 – Case study: UAE Verify and UAE API Marketplace, UAE**

| | |
|---|---|
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals; and resource allocation and funding commitment.<br><br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services. |
| **More information** | https://uaeverify.gov.ae<br><br>https://api.government.ae |

**Table B.3 – Case study: Hackathon, UAE**

| | |
|---|---|
| **Service provider** | TDRA |
| **Publication date** | 2018 |
| **Description** | The UAE Hackathon is a competitive event intended to encourage the use of open data to solve specific challenges in key sectors, and the exploration of emerging technologies. Competitors include schools, universities, entrepreneurs and researchers.<br><br>Events are organized by TDRA, in partnership with other federal and local government agencies and the private sector.<br><br>Government-held datasets are made available before each Hackathon, related to the chosen theme.<br><br>Teams are evaluated using criteria appropriate to their type, including data utilization, solution quality and usability; innovation and creativity, technology usage and maturity; benefits and impact, potential for scalability, feasibility and implementation; originality and novelty, relevance to the challenge theme and research quality. |
| **Use of data and digital technologies** | • metaverse;<br>• augmented reality;<br>• 3d and 4d printing;<br>• artificial intelligence;<br>• internet of things;<br>• blockchain;<br>• big data; and<br>• data analysis. |
| **Benefits** | • Helping creators and innovators to develop and present their ideas and innovations;<br>• Using open government data to enhance wellbeing;<br>• Supporting organizations to work with government in using data;<br>• Enhancing awareness of digital technologies;<br>• Supporting winning teams to turn their ideas into reality; and<br>• Adding new data and information to the open database. |

**Table B.3 – Case study: Hackathon, UAE**

| | |
|---|---|
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals; and resource allocation and funding commitment.<br><br>**People and culture:** Personal skills; team capacity, change management and knowledge-sharing processes; and organizational training and workforce development, recruitment and decision-making processes.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services.<br><br>**User-Centred Design:** Service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and development and use of digital identity. |
| **More information** | https://hackathon.ae |

**Table B.4 – Case study: Altinn Digital, Norway**

| | |
|---|---|
| **Service provider** | Altinn, in co-operation with numerous Norwegian government bodies |
| **Publication date** | 2003 |
| **Description** | Altinn Digital is an internet portal for digital services between government, agencies, businesses and individual users. |
| **Use of data and digital technologies** | Services provided by Altinn Digital include:<br>• Digital Post solutions for mail;<br>• Digital Dialogue solutions for designing forms for user input;<br>• Altinn API for secure data transfer between service providers and users; and<br>• Altinn Studio: A related technical platform with tools that government bodies can use to develop digital services. |
| **Benefits** | • Reliable and trusted services for users;<br>• Engagement between government, agencies and private sector service providers; and<br>• Altinn API enables service providers to create digital services across the public sector involving multiple agencies. |
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals; and resource allocation and funding commitment.<br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services. |
| **More information** | https://www.altinndigital.no/produkter/altinn-api |

**Table B.5 – Case study: Singpass, Singapore**

| | |
|---|---|
| **Service provider** | Smart Nation and Digital Government Office |
| **Publication date** | 2003 |
| **Description** | Singpass provides Singapore residents with their national digital identity, used for secure and convenient transactions in person and online with the government and private sector.<br>Users can securely manage their information and access services, including digital driving licence applications and renewals. |
| **Use of data and digital technologies** | • Singpass app;<br>• API for retrieval of personal details for self-service applications;<br>• APIs for retrieval of corporate data and applicants' personal data;<br>• cloud data platform;<br>• facial recognition; and<br>• QR code. |
| **Benefits** | Secure access to personal and corporate data.<br>Single sign-on to multiple services provided by government agencies and authorized private sector organizations. |
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies.<br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services.<br>**User-Centred Design:** Service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and development and use of digital identity. |
| **More information** | https://www.singpass.gov.sg |

**Table B.6 – Case study: MySkillsFuture, Singapore**

| | |
|---|---|
| **Service provider** | Government of Singapore |
| **Publication date** | 2023 |
| **Description** | MySkillsFuture is a one-stop portal for Singapore residents (including government employees) to upskill in their lifelong learning journey. Individual users can:<br>• discover/understand personal career interests, skills and work values;<br>• learning about growing sectors and the latest in-demand skills; and<br>• upskill and stay relevant by accessing eligible courses.<br>Courses endorsed by the Government of Singapore relating to digital government, specifically targeting current and prospective government and agency employees, include:<br>• digital government services;<br>• government and security;<br>• AI and government;<br>• data architecture, governance and strategy;<br>• cybersecurity governance; and<br>• data protection officer. |
| **Use of data and digital technologies** | Cloud data platform |
| **Benefits** | • alignment with government standards relating to training topics;<br>• engagement between government, training providers and citizen users, boosting user confidence and providing skills data for policy development;<br>• course quality and pricing competitiveness encouraged by multi-provider access to government-endorsed platform;<br>• enhanced user awareness of relevant courses in sectors, including government;<br>• efficient user enrolment in training courses and tracking of progress; and<br>• training providers provide careers advice and employment assistance, helping trainees to search for jobs in relevant sectors. |

**Table B.6 – Case study: MySkillsFuture, Singapore**

| | |
|---|---|
| **Digital maturity dimensions** | **People and culture:** Personal skills; team capacity, change management and knowledge-sharing processes; and organizational training and workforce development, recruitment and decision-making processes.<br><br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services.<br><br>**User-Centred Design:** Service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and development and use of digital identity. |
| **More information** | https://www.myskillsfuture.gov.sg |

**Table B.7 – Case study: Next Generation, UAE**

| | |
|---|---|
| **Service provider** | United Arab Emirates Government |
| **Publication date** | 2023 |
| **Description** | User-centred government portal featuring a chatbot, U-Ask, powered by generative AI. The portal also includes advanced features to support accessibility and inclusivity.<br><br>Over 150 improvements were made to design and technology and over 200 content gaps were filled based on user feedback. App-dynamics analysis is used to inform UCD and development decisions.<br><br>Inclusivity is prioritized through the use of artificial intelligence to support personalized user experiences and deliver custom services.<br><br>The portal provides a range of information and access to services including:<br><br>• Information on local and national government services;<br>• Information on the economy, history and culture, policies and government strategies;<br>• A link to the eParticipation portal (Sharik.ae) which includes: consultations, blogs, forum, ideation, feedback and suggestions, polls, and online chat, in addition to the UAE Government entities' social media accounts on Facebook, Twitter, YouTube and Instagram; and<br>• Information such as events, news and media, contact details, and eGovernment and mGovernment documents and links. |
| **Use of data and digital technologies** | Artificial Intelligence including use of ChatGPT |
| **Benefits** | • Improved accessibility and searchability (from 79% in 2022 to 100% in 2023) with a refined search engine and compliance with Web Content Accessibility Guidelines;<br>• Increased visits (2 million in May-June 2023, up 11% from 2022);<br>• 89% public satisfaction;<br>• Increased public engagement with over 1500 suggestions and feedback received; and<br>• Ethical use of AI and ensuring chatbot compliance with data protection legislation. |

**Table B.7 – Case study: Next Generation, UAE**

| | |
|---|---|
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals.<br><br>**People and culture:** change management and knowledge-sharing processes; and organizational training and workforce development.<br><br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services.<br><br>**User-Centred Design:** service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and development and use of digital identity. |
| **More information** | https://opengov.unescwa.org/case-studies/united-arab-emirates/u-ae-next-generation |

**Table B.8 – Case study: GovTech Advisory and Guidance Tool**

| | |
|---|---|
| **Service provider** | ITS Technology and Innovation Lab, WorldBank |
| **Publication date** | 2023 |
| **Description** | The GovTech Advisory and Guidance Tool is an AI-enabled search tool which enables users to access datasets and related information from past and present GovTech projects globally. A prototype was demonstrated in May 2023. |
| **Use of data and digital technologies** | • artificial intelligence;<br>• cloud data platform;<br>• data analytics; and<br>• machine learning. |
| **Benefits** | • searchable database of projects and related datasets;<br>• sharing of global best practice; and<br>• international data asset. |
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies.<br>**People and culture:** change management and knowledge-sharing processes; and organizational training and workforce development, recruitment and decision-making processes.<br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols.<br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data maturity; and data-driven and data-enabled services.<br>**User-Centred Design:** service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and development and use of digital identity. |
| **More information** | https://www.worldbank.org/en/news/video/2023/06/20/govtech-advisory-and-guidance-tool-gtag-follow-up-webinar-govtech-global-forum-2023 |

**Table B.9 – Case study: Local Digital Project: Chatbots and AI, United Kingdom**

| | |
|---|---|
| **Service provider** | Oxford City Council in collaboration with 11 local authorities |
| **Publication date** | 2019 |
| **Description** | UK Government funded research project to explore the opportunities to use chatbots and artificial intelligence to support and improve service delivery including efficiencies through reducing calls to contact centres.<br>Service delivery areas in scope for the project included:<br>• planning;<br>• waste and recycling;<br>• revenues and benefits; and<br>• highways.<br>The project aimed to develop a body of research, templates and information to share with other local government organizations. Areas of focus for the research included:<br>• public attitudes;<br>• ability to handle high-volume/low-complexity issues;<br>• use of natural language processing; and<br>• voice applications. |
| **Use of data and digital technologies** | • artificial intelligence;<br>• cloud data platform;<br>• data analytics; and<br>• machine learning. |
| **Benefits** | • Detailed body of evidence to demonstrate the potential impact of chatbots and artificial intelligence;<br>• Team members undertook training in enabling areas including agile project management and user research;<br>• Project deliverables included summaries of activity in the following areas: user research, case studies, technology landscape, conversational AI architecture and return on investment and market; and<br>• Quantification of the market opportunity for local governments to adopt chatbots and artificial intelligence. |

**Table B.9 – Case study: Local Digital Project: Chatbots and AI, United Kingdom**

| | |
|---|---|
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals; and resource allocation and funding commitment.<br><br>**People and culture:** Personal skills; team capacity, change management and knowledge-sharing processes; and organizational training and workforce development, recruitment and decision-making processes.<br><br>**Legislation and governance:** Regulatory and governance frameworks; compliance with standards, guidelines and international and inter-departmental protocols; and service definitions, contracts and partnership agreements.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; integration with services, remote working and operational functions; and risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management; data management, data verification and trust, and data maturity; and data-driven and data-enabled services.<br><br>**User-Centred Design:** service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and development and use of digital identity. |
| **More information** | https://localdigitalchatbots.github.io/ |

**Table B.10 – Case study: Government Innovation Platform: ibtekr.org, UAE**

| | |
|---|---|
| **Service provider** | Mohammed Bin Rashid Centre for Government Innovation (MBRCGI) |
| **Publication date** | 2021 |
| **Description** | Ibtekr is a platform dedicated to encouraging and promoting government innovation. It includes training courses, case studies and an online innovation community. The platform seeks to build capabilities within the public sector and strengthen cooperation with international and regional partners.<br>Ibtekr manages an innovation observatory focused on sharing successful public sector innovation use cases from around the world. Users can submit innovations for assessment through an online form. Innovations are assessed on the basis of novelty, replicability, and impact.<br>MBRCGI has also launched a generative AI chatbot, focused on Government Innovation, InnovateGPT, powered by OpenAI's GPT technology. |
| **Use of data and digital technologies** | • artificial intelligence;<br>• cloud data platform;<br>• data analytics; and<br>• machine learning. |
| **Benefits** | • searchable database of projects;<br>• generative AI-powered chatbot focused on public sector innovation;<br>• sharing of best practice;<br>• online training courses and e-library with national and international content; and<br>• online community with events and workshops. |

**Table B.10 – Case study: Government Innovation Platform: ibtekr.org, UAE**

| | |
|---|---|
| **Digital maturity dimensions** | **Leadership and strategy:** Vision for effective operational use of data and digital technologies; strategic alignment with organizational goals.<br><br>**People and culture:** Personal skills; team capacity, change management and knowledge-sharing processes; and organizational training and workforce development.<br><br>**Legislation and governance:** Compliance with standards, guidelines and international and inter-departmental protocols.<br><br>**Technology and frameworks:** Infrastructure, hardware, software, cloud services; technology resilience, adoption of existing and novel/emerging data and digital technologies.<br><br>**Systems and data:** Enterprise and data architecture, cloud systems, data transfer systems; data maturity; and data-driven and data-enabled services.<br><br>**User-Centred Design:** service innovation and design standards; openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication. |
| **More information** | https://mbrcgi.gov.ae/<br>https://ibtekr.org/en/about/ |

## Annex C (informative)
## Digital maturity assessment tools

This Annex provides examples of digital maturity assessment frameworks sponsored at a national or international level.

**Table C.1 – Digital Government Exchange Working Group**

| | |
|---|---|
| **Title** | Digital Maturity Framework MVP (Minimum Viable Product) |
| **Sponsors** | Governments of the UK, China, Finland, Japan, Singapore, Republic of Korea (represented by World Bank) |
| **Publication date** | 2022 |
| **Description** | Established in response to the global challenge for governments to become digitally mature at both the national and sub-national level. The working group's stated objectives are to:<br>• develop a common framework to measure digital maturity;<br>• leverage the framework to benchmark participating countries' digital maturity; and<br>• share best practices and challenges in public sector digitalization. |
| **Digital maturity dimensions** | • UCD;<br>• culture of digital by design;<br>• data-driven approach;<br>• appropriate technology and infrastructure;<br>• senior leadership buy-in and appropriate governance;<br>• appropriate institutional funding and capacity; and<br>• digital capability. |
| **More information** | https://www.tech.gov.sg/files/media/corporate-publications/FY2021/DGX%20Digital%20Maturity%20Working%20Group%20Report%202021%20-%20Digital%20Maturity%20MVP.pdf |

**Table C.2 – Government of South Australia**

| | |
|---|---|
| **Title** | Digital Strategy Toolkit, including Digital Maturity Assessment Tool |
| **Publication date** | 2015 |
| **Sponsor** | Office for Digital Government |
| **Description** | The Digital Strategy Toolkit currently comprises four tools for use by South Australian Government departments, agencies and authorities to support the development of digital strategies:<br>• Digital Maturity Assessment Tool;<br>• Digital Transformation Prioritization Tool;<br>• Digital Strategy Template; and<br>• Digital Strategy Implementation Plan Template.<br>The Digital Maturity Assessment Tool is a self-assessment framework to enable government organizations to measure their level of digital maturity. |
| Digital maturity dimensions | • governance and leadership;<br>• people and culture;<br>• capacity and capability;<br>• innovation; and<br>• technology. |
| **More information** | https://www.dpc.sa.gov.au/__data/assets/pdf_file/0008/46565/Digital_Transformation_Toolkit_Guide.pdf |

**Table C.3 – Organisation for Economic Co-operation and Development (OECD)**

| | |
|---|---|
| **Title** | Digital Government Policy Framework and Digital Government Toolkit |
| **Publication date** | 2020 |
| **Sponsors** | 38 member countries of OECD |
| **Description** | The Digital Government Policy Framework consists of six dimensions that comprise a fully digital government.<br>It is supported by a toolkit which is designed to help member countries to implement the OECD Recommendation on Digital Government Strategies. It enables comparison of good practices across member countries and might guide decision-makers in using digital technologies to encourage innovation, transparency and efficiency in the public sector.<br>The toolkit also includes a series of self-assessment reference documents which provide an overview of each principle and characteristics of early, intermediate and advanced stages of development for each principle; and the practices and policies that should be considered to progress their implementation. |
| Digital maturity dimensions | • digital by design;<br>• data-driven;<br>• government as a platform; |

**Table C.3 – Organisation for Economic Co-operation and Development (OECD)**

| | |
|---|---|
| **Title** | Digital Government Policy Framework and Digital Government Toolkit |
| | • open by default;<br>• user driven; and<br>• proactiveness. |
| **More information** | https://www.oecd.org/governance/the-oecd-digital-government-policy-framework-f64fed2a-en.htm<br>https://www.oecd.org/governance/digital-government/toolkit/home/ |

**Table C.4 – Organisation for Economic Co-operation and Development (OECD) Tax Administration**

| | |
|---|---|
| **Title** | Digital Transformation Maturity Model |
| **Publication date** | 2021 |
| **Sponsors** | 38 member countries of OECD |
| **Description** | The Digital Transformation Maturity Model covers the key building blocks of tax administration.<br>A self-assessment tool is available which provides descriptions of capabilities and performance in activities carried out by tax administrations across five discrete maturity levels.<br>The model has also been used to enable administrations to benchmark their own maturity in different aspects of digital transformation to that of their peers. |
| **Digital maturity dimensions** | • digital identity;<br>• taxpayer touchpoints;<br>• data management and standards;<br>• tax rule management and application;<br>• new skill sets; and<br>• governance frameworks. |
| **More information** | https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/digital-transformation-maturity-model.htm |

**Table C.5 – UAE Government**

| | |
|---|---|
| **Title** | Digital Government Maturity Model Framework/Maturity Assessment |
| **Publication date** | 2021 |
| **Sponsor** | TDRA |
| **Description** | The TDRA launched the UAE digital government maturity model to enhance the UAE's overall performance in online services. It is a guideline for government departments to help measure their ability to create a digitally mature and sustainable government.<br>The maturity model has three pillars and nine dimensions and is assessed against five levels of maturity. Most dimensions have a set of sub-dimensions that guide enabling actions that each ministry or authority might take to increase their maturity along each dimension. |
| **Digital maturity dimensions** | Pillar 1: Leadership and policies:<br>• leadership;<br>• strategy;<br>• governance; and<br>• legal.<br>Pillar 2: Technological accelerator:<br>• technology;<br>• cybersecurity; and<br>• specific technologies and new trends.<br>Pillar 3: Organizations and data:<br>• API ecosystem management; and<br>• ministry/authority specific. |
| **More information** | https://u.ae/en/about-the-uae/digital-uae/regulatory-framework/uae-digital-government-maturity-model |

**Table C.6 – UK Government**

| | |
|---|---|
| **Title** | Data Maturity Assessment for Government |
| **Publication date** | 2023 |
| **Sponsor** | Central Digital and Data Office |
| **Description** | This assessment framework has been designed specifically for the public sector, with a focus on identifying strengths and weaknesses in an organization's data ecosystem. The data maturity assessment framework comprises ten topics and six themes.<br>It is provided as a detailed self-assessment tool with individual assessment rows which describe the features or behaviours for the theme or topic across five levels of maturity. The ten topics are:<br>• engaging with others;<br>• having the right data skills and knowledge;<br>• having the right systems;<br>• knowing the data you have;<br>• making decisions with data;<br>• managing and using data ethically;<br>• managing your data;<br>• protecting your data;<br>• setting your data direction; and<br>• taking responsibility for data. |
| **Digital maturity dimensions** | • uses;<br>• data;<br>• leadership;<br>• culture;<br>• tools; and<br>• skills. |
| **More information** | https://www.gov.uk/government/collections/data-maturity-assessment-for-government |

**Table C.7 – World Bank**

| | |
|---|---|
| **Title** | Digital Government Readiness Assessment |
| **Publication date** | 2020 |
| **Sponsors** | 189 member countries |
| **Description** | The toolkit aims to help governments at all levels in developing countries to assess their readiness for digital transformation. It comprises both qualitative and quantitative tools to help governments identify the strengths and weaknesses of their current digital government status and future actions to improve and/or develop their ICT strategy.<br><br>The assessment comprises nine core foundations with a focus on building agile and open digital government infrastructure and operations. It is supported by an online tool and database, which enables analysis of multiple respondents and benchmarking scores against other countries. |
| **Digital maturity dimensions** | • leadership and governance;<br>• UCD;<br>• public administration and change management;<br>• capabilities, culture and skills;<br>• technology infrastructure;<br>• data infrastructure, strategies and governance;<br>• cybersecurity, privacy and resilience;<br>• legislation and regulation; and<br>• digital ecosystem. |
| **More information** | https://www.worldbank.org/en/data/interactive/2022/08/22/digital-government-readiness-assessment-dgra-toolkit |

## Annex D (informative)
## Ministry- and department-specific considerations

This Annex provides guidance on specific considerations to measure the digital maturity of a specific government ministry or department.

**Table D.1 – Ministry- and department-specific considerations**

| Digital maturity dimension | Considerations |
|---|---|
| Leadership and strategy, including:<br>• vision for effective operational use of data and digital technologies;<br>• strategic alignment with organizational goals; and<br>• resource allocation and funding commitment. | • Developing a ministry- or department-specific technology roadmap; and<br>• Aligning with relevant United Nations Sustainable Development Goals. |
| People and culture, including:<br>• personal skills;<br>• team capacity, change management and knowledge-sharing processes; and<br>• organizational training and workforce development, recruitment and decision-making processes. | • Providing appropriate e-learning and/or training to support digital services. |
| Legislation and governance, including:<br>• regulatory and governance frameworks;<br>• compliance with standards, guidelines, and international and inter-departmental protocols; and<br>• service definitions, contracts and partnership agreements. | • Enabling regulatory compliance<br>• Providing digital services to support applications, certification, accreditation, documentation, licensing, registration and declarations; and<br>• Enabling users to make changes, e.g. renew, modify, cancel or transfer. |
| Technology and frameworks, including:<br>• infrastructure, hardware, software and services;<br>• integration with services, remote working and operational functions; and<br>• risk management, cybersecurity, data privacy, technology resilience, adoption of existing and novel/emerging data and digital technologies. | • Providing an open digital platform or portal to support digital services;<br>• Using apps, digital systems and data exchange platforms;<br>• Enabling users to request support or make an enquiry through digital services;<br>• Enabling online payment; and<br>• Using the Internet of Things/sensors to capture data. |

| | |
|---|---|
| Systems and data, including:<br>• enterprise and data architecture, cloud systems, data transfer systems and API ecosystem management;<br>• data management, data verification and trust, and data maturity; and<br>• data-driven and data-enabled services. | • Supporting the use of open data;<br>• Providing access to datasets, statistical data and forecasts;<br>• Integration with third-party data sources;<br>• Enabling users to manage their personal data/personal profile;<br>• Providing a data dictionary/metadata repository; and<br>• Enabling users to create and access reports, dashboards, alerts and notifications. |
| UCD, including:<br>• service innovation and design standards;<br>• openness, transparency, inclusiveness, accessibility, respect, engagement, user feedback, participation and communication; and<br>• development and use of digital identity. | • Engaging with users through the use of surveys, e-participation and e-consultation;<br>• Publishing digital content, information and advice, links and references;<br>• Using social media; and<br>• Including a help section within digital services. |

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