Digital Landscape Assessment

State of Palestine

2021

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List of acronyms

3G	Third generation of wireless mobile telecommunications technology
AI	Artificial Intelligence
AMAN	Coalition for Accountability and Integrity – a civil society organization that seeks to combat corruption and promote integrity, transparency, and accountability in the Palestinian society
API	Application Programming Interface – a software intermediary that allows two applications to talk to each other
CERT	Computer Emergency Response Team
CIRT	Cyber Incident Response Team
COVID-19	Novel Coronavirus (2019-nCoV)
CRM	Customer relationship management
eIDAS	European Union's Electronic Identification and Trust Services Regulation
ERP	Enterprise resource planning
ESCWA	United Nations Economic and Social Commission for West Asia
EU	European Union
GBV	Gender-based violence
GDP	Gross domestic product
GeoMolg	Palestinian government platform for viewing geodata
GIS	Geographic Information System
ICTs	Information and communication technologies
ID	Identification
IT	Information technology
ITU	International Telecommunications Union
ML	Machine learning
MoU	Memorandum of Understanding
MSMEs	Micro-small and medium enterprises
MTIT	Ministry of Telecom and Information Technology

NDP	National Development Plan
NGO	Non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OIC-CERT	Organisation of the Islamic Cooperation – Computer Emergency Response Teams
PALTEL	Palestine Telecommunications Company
PITA	Palestinian Information Technology Association of Companies
PKI	Public Key Infrastructure
PMA	Palestine Monetary Authority
SDG	Sustainable Development Goal
SMEs	Small and medium enterprises
SQL	Structured Query Language
SSO	Single sign-on
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme

Terms and definitions

Application	Software that is dependent on the services of an operating system.
Certification authority	A trusted entity that manages and issues digital certificates and public keys that are used for secure communication in a public network.
Cyber security	(a) The security of cyber devices; and (b) security against threats created through the operation of cyber devices. (NOTE: Security usually means a situation where risks are not materialized.)
Data	Reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing.
Data exchange	The exchange, storing, accessing, transferring, and archiving of data.
Digital identity	A set of data and software protected with cryptographic means.
Digital signature	Signature based upon cryptographic methods of originator authentication, computed by using a set of rules and a set of parameters such that the identity of the signer and the integrity of the data can be verified.
E-governance	Electronic governance, the application of information and communication technology for delivering government services, exchange of information,

	communication transactions, integration of various stand-alone systems and services between government-to-customer (g2c), government-to-business (g2b), government-to-government (g2g), as well as back-office processes and interactions within the entire government framework.
E-government	Using the tools and systems made possible by information and communication technologies to provide better public services to citizens and businesses.
Encryption	Process of encoding messages (or information) in such a way that only authorized parties can read it.
E-services	Library services delivered via electronic means, whether from local servers or provided via networks.
Interoperability	Ability of two or more systems or components to exchange information and to use the information that has been exchanged.
Open data	Data that can be freely used, re-used, and redistributed by anyone without restrictions from copyright, patents, or other mechanisms of control.
Payment gateway	A service that authorizes a user's transfer of funds between financial institutions to providers and retailers without direct delivery of either bank or credit card account information.
Personal identity number	Numeric code used to authenticate an identity.
Public key infrastructure	A set of roles, policies, and procedures needed to create, manage, distribute, use, store, and revoke digital certificates and manage public-key encryption.
Trust service	An electronic service normally provided for remuneration that consists of: a) the creation, verification, and validation of electronic signatures, electronic seals or electronic time stamps, electronic registered delivery services, and certificates related to those services, or b) the creation, verification, and validation of certificates for website authentication.
X-road	A solution for secure data exchange across ministries that has been implemented in Palestine. The system was developed in Estonia.
Zinnar	The Palestinian Interoperability Framework set up to understand and agree on the vocabulary, meaning, structure, codes, and business rules pertaining to the exchange of data.

Executive summary

Digital transformation has become an imperative for countries across the world to address complex development challenges, drive economic growth, and realize the Sustainable Development Goals (SDGs). In the face of continued occupation, the State of Palestine has embarked on a mission to leverage the potential of a digital transformation to tackle its persistent development challenges, which have been further exacerbated by the COVID-19 pandemic, and to be on the path to achieving the SDGs.

An essential step in the digital transformation process is to assess the digital landscape of a country through an SDG lens to ensure the benefits of this transformation are realized by all. In this regard, UNDP and the e-Governance Academy of Estonia jointly supported the State of Palestine in conducting a Digital Landscape Assessment (DLA), which analyses the digital landscape of Palestine within the framework of the SDGs and identifies digital solutions for acceleration towards the goals. The DLA is comprised of three components: a) Rapid Integrated Assessment; b) Digital Maturity Assessment; and c) Bottleneck Assessment. This report will focus on the analysis of the DLA.

UNDP conducted the **Rapid Integrated Assessment** (RIA), which assesses the alignment of digital targets within the State of Palestine's National Policy Agenda 2017–2022 and 17 sector strategies with relevant SDG targets. The objectives of the assessment were to identify gaps in alignment and the opportunities for digital interventions, the landscape of entities responsible for implementation of the digital/ICT targets, and the balance of the identified digital targets across the five dimensions of sustainable development (People, Planet, Prosperity, Peace, and Partnership). The aim of the RIA is to inform the development of the next State of Palestine's national development plan and sector strategies, as well as the development of its digital transformation roadmap.

The RIA analysed seven policy areas outlined in the National Policy Agenda: (1) Citizen-centred Government, (2) Effective Government, (3) Economic Independence, (4) Social Justice and Rule of Law, (5) Quality Education for All, (6) Quality Health Care for All, and (7) Resilient Communities. The analysis found that digital/ICT targets in the planning documents align with (contribute to) 66 of the 106 relevant SDG targets, which is a 62 per cent alignment. However, only 18 of the 66 aligned targets have indicators to monitor implementation of the digital/ICT targets. While the assessment points to a fairly good degree of alignment with the SDG targets, 40 SDG targets are not addressed by digital/ICT interventions.[1] When assessing the alignment of the digital targets with the five dimensions of sustainable development,[2] the analysis found a stronger alignment of the digital targets with the Peace and People dimensions of sustainable development (68 and 67 per cent, respectively) and weaker alignment with the Prosperity, Planet, and Partnerships dimensions (53, 46, and 15 per cent, respectively). While a 100 per cent alignment of digital targets across all five dimensions is not expected, it is

[1] The relevant SDG targets not addressed include the following: 2.5; 3.5; 4.2; 4.7; 5.3; 5.4; 6.3; 6.4; 6.5; 6.6; 7.3; 8.4; 8.7; 8.10; 9.1; 9.3; 10.7; 11.5; 11.7; 12.1; 12.2; 12.3; 12.6; 12.7; 13.1; 13.2; 14.1; 14.2; 14.3; 14.4; 15.1; 15.6; 15.8; 15.9; 16.7; 16.9; 17.6; 17.16; 17.17; 17.18.

[2] People: End poverty and hunger in all its forms and dimensions and ensure dignity and equality; Planet: Protect natural resources and climate of our planet for future generations; Prosperity: Ensure a prosperous and fulfilling life in harmony with nature; Peace: Promote peaceful, just and inclusive societies; Partnerships: Implement the agenda through a strong Global Alliance for Sustainable Development.

important to ensure balance across all five dimensions, that is, that alignment of digital targets is not skewed towards a particular dimension/s.

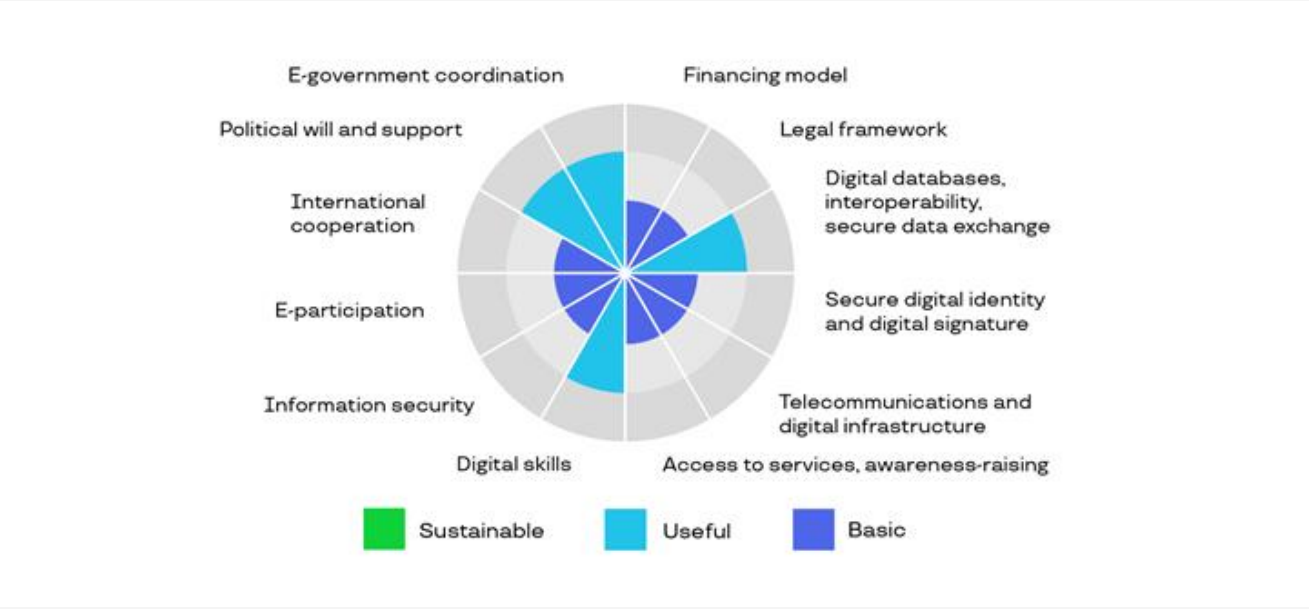
Based on the results of the analysis, a set of recommendations have been provided to integrate key digital targets into the State's planning documents. However, it is noted that given the constraints of the Israeli occupation, these recommendations can only be adopted as appropriate to the context.

In addition to the RIA, experts from the e-Governance Academy carried out the **Digital Maturity Assessment** of the State of Palestine in the last quarter of 2020. The report is based on results of the surveys and interviews conducted with the following stakeholders:

1. Ministry of Telecommunications and Information technology (12 and 28 October 2020)
2. Ministry of Interior (12 October 2020)
3. Ministry of Transportation (12 October 2020)
4. Palestine Polytechnic University (13 October 2020)
5. Ministry of Education (14 October 2020)
6. Ministry of Health (14 October 2020)
7. Ministry of Justice (14 October 2020)
8. Palestine Monetary Authority (14 October 2020)
9. Ministry of National Economy (14 October 2020)
10. General Personnel Council (19 October 2020)
11. Palestinian Central Bureau of Statistics (19 October 2020)
12. Ministry of Finance (21 October 2020)

The report assesses the maturity of the Palestinian public sector in 12 e-government domains and proposes recommendations based on worldwide best practice, which would help the State of Palestine to move towards more mature levels of e-government. The overview of the current e-government maturity is depicted in Figure 1 below.

Figure 1. Current e-government maturity of the public sector of the State of Palestine

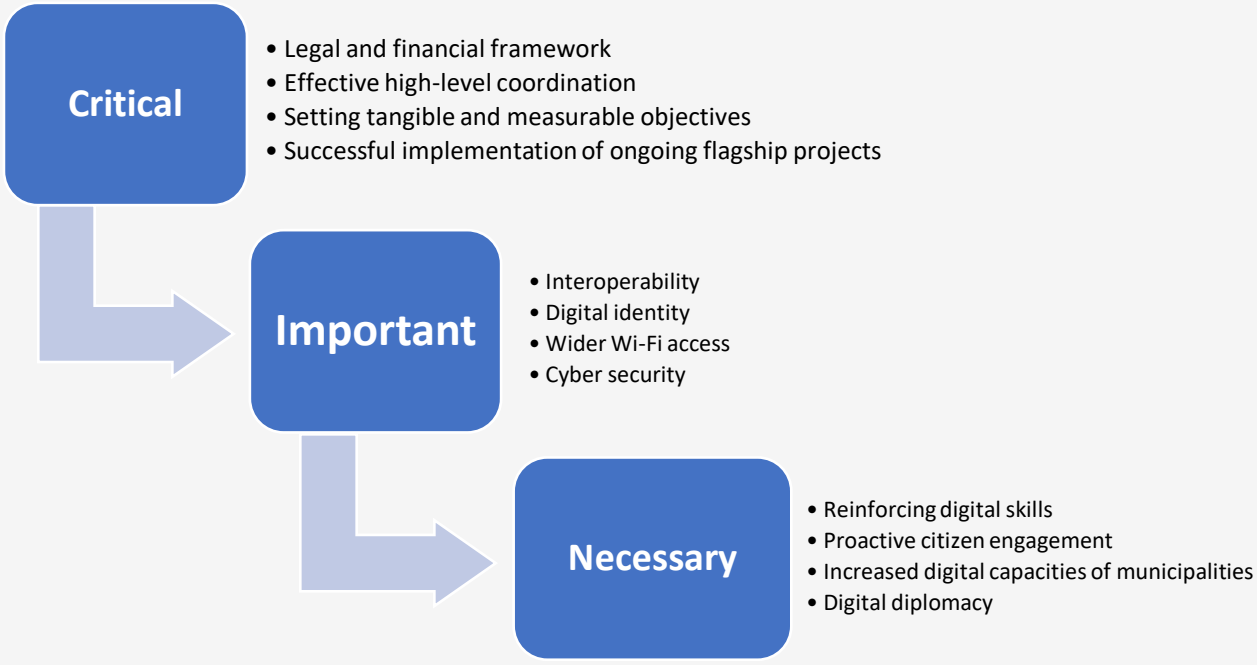


Based on the analysis of the data collected, the State of Palestine is primarily at the Basic maturity level. To reach the next level in digital transformation, it is critical for the State of Palestine to further improve the high-level strategic coordination of e-government together with the adoption of legal acts that would make further digitalization possible. The timely successful implementation of ongoing projects featuring e-payments, single sign-on, and government e-services portal is a strategic priority that requires immense attention and careful monitoring.

As a next step, it is important to turn attention to digital transformation enablers, such as digital identity management framework, the quality of main state registers and their interoperability, improved Internet access, and the practical implementation of strategic priorities.

At the same time, reinforcing digital capacities of citizens and municipalities should receive attention, together with developing tools for engagement and advancing international cooperation.

Figure 2. Key recommendations on e-government



To move forward with each of these priority areas, high-level agreement is needed for each one on the ultimate objective, target group, activities to be undertaken, and implementation plan – including measurable objectives, responsible actors, and timeline.

The final component of the DLA – the **Accelerator and Bottleneck Assessment** (ABA) – was undertaken by the UNDP team. The main objective of the ABA was to map key digital interventions that are being implemented across sectors in the State of Palestine, identify bottlenecks to implementation, and recommend possible solutions to those bottlenecks. The assessment required a series of meetings with key representatives from various sectors, including over 10 ministries, academia, and the private sector.

Bottlenecks to implementation of key digital interventions were identified based on five broad non-exhaustive categories as well as its subcategories: (1) policy and planning, (2) budget and financing, (3) service delivery

(supply), (4) service utilization (demand), and (5) cross-cutting areas. Some of the bottlenecks identified include:

- a rigid regulatory framework that makes it difficult to create/modify laws in order to advance digital services
- limited engagement of key stakeholders in the development of the national digital transformation plans
- unstable sources of funding and limited public resources available for digital initiatives
- limited human resources capacities dedicated to ICT technologies and related activities
- difficulty in retaining internal expertise due to limited budget, and
- telecommunication spectrum challenges given that there is no agreement with Israel, which prevents the rollout of 4G technology. Based on the bottlenecks identified, the report provides a set of solutions to help address these challenges and support the State of Palestine in advancing its digital transformation agenda.

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Introduction

The State of Palestine has an immense opportunity to tackle its persistent development challenges and be on track to achieve the SDGs. Digital transformation has become an imperative in the face of Palestine's development challenges, which have been further exacerbated by the COVID-19 pandemic. The prospects of the Palestinian economy will depend on how effectively the government leverages digital technologies and governs their interplay with major trends, including the changing nature of work, demographic transition, climate change, and urbanization. Pandemic-related travel bans, the physical closure of schools, workplaces, and businesses, and the increased need for health care services have also prompted an urgent need for digital solutions to be able to operate effectively.

UNDP and the Government of Estonia are collaborating on efforts that support digital transformation as a sustainable development pathway in the Arab States. The cooperation leverages the digital evolution and expertise and achievements of Estonia through the years, alongside UNDP's expertise in, longstanding support for, and sustained investments in sustainable development. UNDP and Estonia's e-Governance Academy provided support to the State of Palestine in conducting a *Digital Landscape Assessment* (DLA), which analyses the digital landscape of Palestine within the framework of the SDGs and identifies digital solutions for acceleration towards the goals. The DLA is comprised of three components:

1. Rapid Integrated Assessment
2. Digital Maturity Assessment
3. Accelerator and Bottleneck Assessment

The Rapid Integrated Assessment aimed to analyse the alignment of digital targets within the National Policy Agenda 2017–2022 and key sector strategies of the State of Palestine with relevant SDG targets, and to identify gaps as well as opportunities. The objective of the Digital Maturity Assessment was to analyse the maturity of the Palestinian public sector in 12 e-government domains and to propose recommendations based on worldwide best practice, which would propel the State of Palestine towards more mature levels of e-government. The Accelerator and Bottleneck Assessment aimed to facilitate the mapping of key digital interventions across sectors based on interviews with national stakeholders, identify bottlenecks to implementation of those interventions, and propose solutions to those bottlenecks. This report outlines the findings of the three components of the DLA and provides recommendations to support the State of Palestine in its path towards digital transformation.

Digital Landscape Assessment

- Rapid Integrated Assessment
- Digital Maturity Assessment
- Accelerator and Bottleneck Assessment

1 Rapid Integrated Assessment

The 2030 Agenda for Sustainable Development, adopted by all UN Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet. At the heart of the Agenda lies the 17 Sustainable Development Goals (SDGs), which recognize that ending poverty and other deprivations must be combined with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve the natural environment.

The 2030 Agenda for Sustainable Development is based on three principles:

- Universality: Universality does not mean uniformity. Rather, it implies that goals and targets are relevant to all governments and actors based on the principle of common but differentiated responsibilities. This principle provides the anchoring for the implementation of the SDGs at the national level, namely the localization of SDGs.
- Integration: Policy integration means balancing all three sustainable development dimensions: social, economic, and environmental. An integrated approach implies managing trade-offs and maximizing synergies across targets.
- No one left behind: The principle of 'no one left behind' advocates for countries to go beyond national averages. The SDGs should benefit all – eradicating poverty and reducing inequalities. Therefore, the promotion and use of disaggregated data is key.

The State of Palestine committed itself to implementing the 2030 Agenda and its SDGs by integrating the SDGs into its National Policy Agenda 2017–2022 and sectoral strategies, while taking into account the impediments of the Israeli occupation and the difficult fiscal situation.

1.1 Development context in the State of Palestine

The population in the State of Palestine remains in a situation of vulnerability and structural disadvantage due to the continued Israeli occupation and the political division between the West Bank and Gaza.[3] Consecutive years of low economic growth[4] and multiple development challenges continue to afflict the State. The socio-economic impacts of COVID-19 are further exacerbating existing vulnerabilities. According to estimates from the UN 2021 Humanitarian Needs Overview, over 47 per cent of the population (2.45 million) are in need of some form of humanitarian assistance, of which about 64 per cent (1.57 million) live in Gaza.[5]

The state of food insecurity in Palestine remains high. It is estimated that 2 million Palestinians (over 38 per cent of the population) are severely or moderately food insecure, and that they will require food assistance and/or support in maintaining their livelihoods in 2021.[6] Nearly 72 per cent of the food insecure (over 1.4 million) live in Gaza.[7]

[3] See https://www.unfpa.org/sites/default/files/portal-document/N1724786.pdf.
[4] See https://www.worldbank.org/en/country/westbankandgaza/publication/economic-update-october-2020.
[5] UN OCHA, "Humanitarian Needs Overview OPT: Humanitarian Programme Cycle 2021" (December 2020), https://reliefweb.int/sites/reliefweb.int/files/resources/hno_2021.pdf.
[6] Ibid.
[7] Ibid.

In 2020 the unemployment rate in Palestine reached nearly 26 per cent, with over 42 per cent of youth unemployed.[8] Women are also disproportionately affected by the economic climate and limited job opportunities, with over 40 per cent of women unemployed.[9] Lockdown measures implemented in early March 2020 to contain the pandemic have had severe implications. Approximately 121,000 Palestinians lost their jobs in the second quarter of 2020,[10] with the impacts being more pronounced in Gaza, with unemployment reaching 48.6 per cent in the third quarter of 2020, while it reached 18.7 per cent in the West Bank.[11] Analysis of a household survey conducted by the Palestinian Central Bureau of Statistics to assess the socio-economic impact of the pandemic on households found that 80 per cent of the primary income earners of households surveyed experienced a decline in their work hours.[12] Only 23 per cent of primary income earners received their usual wages/salaries, 25 per cent received partial wages/salaries, and 52 per cent received no wages/salaries during the lockdown period.[13] In addition, 4 per cent of households in need of health services were unable to access such services.[14] One of the main reasons for this lack of access was that health care centres and hospitals did not receive patients at the time (39 per cent).[15] Further, only 51 per cent of households surveyed reported that their children participated in any educational activities during the lockdown period, and of these 40 per cent evaluated the experience as poor.[16] About half of the households reported that their children were deprived of remote education due to the unavailability of Internet access.[17]

Lockdown measures have also had fiscal implications. Revenues collected by the Palestine National Authority from trade, tourism, and transfers declined to their lowest levels in 20 years.[18] The fiscal impact has been amplified by the additional expenditure needed on health, social welfare, and support for the private sector to mitigate the impacts of the pandemic.

The State of Palestine continues to face challenges related to infrastructure development. IT infrastructure remains under the nearly complete control of Israel. Thus, Palestinian IT infrastructure is dependent on Israeli systems, resulting in Palestinians paying more than their Israeli counterparts for a lower quality of IT services. Palestinians are still unable to access the 4G network, where access to the 3G network was only enabled in 2018, and then only in the West Bank. As of 2015 only 53.7 per cent of Palestinians were using the Internet.

[8] See https://ilostat.ilo.org/data/country-profiles/.
[9] Ibid.
[10] World Bank (2020), https://thedocs.worldbank.org/en/doc/20006620c264fb78d6fe7a6fcd325ba4-0280012021/original/13-mpo-sm21-palestinian-territories-pse-kcm2.pdf.
[11] UN OCHA, "Humanitarian Response Plan OPT: Humanitarian Programme Cycle 2021" (December 2020), https://www.ochaopt.org/sites/default/files/hrp_2021.pdf.
[12] See http://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=3825.
[13] Ibid.
[14] Ibid.
[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] UNCTAD, "COVID-19 devastates Palestine's shattered economy" (2020), https://unctad.org/news/covid-19-devastates-palestines-shattered-economy.

1.2 Rapid Integrated Assessment: Objectives and methodology

The Rapid Integrated Assessment (RIA) assesses the alignment of digital targets within the State of Palestine's national development plan and sector strategies with the SDG targets.

Key objectives of the RIA include:

- Assess the level of alignment of digital/ICT targets within the national development framework, including sector strategies, with the SDG targets, and identify gaps and opportunities for digital interventions.
- Identify relevant digital/ICT indicators as captured in development plans/sector strategies.
- Identify landscape of entities with responsibility on specific digital/ICT targets.
- Assess balance of digital targets addressed in a country's development planning framework across the five dimensions of sustainable development: People, Planet, Prosperity, Peace, and Partnership.[19]
- Inform the development of the next State of Palestine's national development plan and sector strategies as well as the development of its digital transformation roadmap.

Key outputs of the RIA include:

- An SDG/Digital Landscape profile card
- Recommendations based on the digital/ICT gaps identified

The RIA analysis is conducted based on two templates. Template 1 in Figure 3 provides a digital profile card for the State of Palestine (see Excel file and Figure 3) and identifies the closest Digital Goal/Target presented in planning documents that contribute to the corresponding SDG Goal/Target (in this case to Goal 1), the national priority under which the digital target appears, indicators for the identified digital targets as outlined in the planning documents, the ministries responsible for target implementation, and the balance of the identified digital targets across the five dimensions of sustainable development.

Template 2 in Figure 4 provides a snapshot of integration/gap analysis related to SDG 1 and SDG 2 that builds on information from Template 1.

[19] People: End poverty and hunger in all its forms and dimensions and ensure dignity and equality; Planet: Protect natural resources and climate of our planet for future generations; Prosperity: Ensure a prosperous and fulfilling life in harmony with nature; Peace: Promote peaceful, just and inclusive societies; Partnerships: Implement the agenda through a strong Global Alliance for Sustainable Development.

Figure 3. Template 1: Digital Profile Card

SDGs Goals/Targets	National Priorities/Sectors as Identified in Key Planning Documents	Identify closest Digital Goal/Target presented in Planning Documents addressing the issues in the corresponding SDG Goal/Target	Identify Indicators for the Specific Targets	Ministry Responsible for Target implementation	Any relevant comment related to this priority target area in the Planning documents?
Goal 1. End poverty in all its forms everywhere					
1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	Social Justice and Rule of Law (escaping poverty) NPA 38	1- Adopting the labor market data system as a database that provides match between supply and demand, and as a source for research and studies. P32 Labor 3- Providing regular cash assistance via cards (public transport support card, electricity card, water supporting card, consumption needs purchase card (food and non-food), certain discount cards, etc.) P78 Social Dev	P13 Labor 1- Labor market information system (LMIS) is activated and updated.	Ministry of Labor	Ministry of ICT and private sector could be engaged as well. There is no indicator available for providing cash assistance via cards.
1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Social Justice and Rule of Law (escaping poverty) NPA P38	1- Providing regular cash assistance via cards (public transport support card, electricity card, water supporting card, consumption needs purchase card (food and non-food), certain discount cards, etc.) p78 Social Dev 2- Creating an MIS information system and unified databases about poor families, their needs and the services provided to them. P45 Social Dev 3- To establish a unified information system on the needs of poor families. P78 social dev		Ministry of Social Development	Ministry of ICT and Bureau of Statistics could be engaged. Ministry of Women Affairs could be engaged on gender disaggregated data. Lack of indicators for providing cash assistance via cards as well as on creating an MIS information system and unified database .

Figure 4. Template 2: Snapshot of gap analysis

#	National Priorities	SDG-1: Poverty					SDG-2: Hunger				
		1,1	1,2	1,3	1,4	1,5	2,1	2,2	2,3	2,4	2,5
1	Citizen Centred Government										
2	Effective Government										
3	Economic Independence										
4	Social Justice and Rule of Law	X	X	X	X						
5	Quality Education for All										
6	Quality Health for All							X			
7	Resilient Communities					X	X		X	X	

Legend	
X	Aligned target
	Not aligned
	Target non-relevant
	Gaps

UNDP conducted a Rapid Integrated Assessment of the State of Palestine's National Policy Agenda 2017–2022 and related sector plans and strategies against the SDG targets. The seven policy areas assessed are those listed in the National Policy Agenda, namely: Citizen-centred Government, Effective Government, Economic Independence, Social Justice and Rule of Law, Quality Education for All, Quality Health Care for All, and Resilient Communities.

In addition to the National Policy Agenda, the assessment reviewed the following sector plans and strategies:

1. Economic Sector Strategy 2017–2022
2. Education Strategy 2017–2022
3. Energy Strategy 2017–2022
4. Environment Strategy 2017–2022
5. Public Financial Management Sector Strategy 2017–2022
6. Gender Strategy 2017–2022
7. Health Strategy 2017–2022
8. ICT Strategy 2017–2022
9. Labour Sector Strategy 2020–2022
10. The National Strategy for the Justice Sector and the Rule of Law 2017–2022
11. Local Government Strategy 2017–2022
12. Security Strategy 2017–2022
13. Social Development Strategy 2017–2022
14. Tourism Strategy 2017–2022
15. Transportation Strategy 2017–2022
16. Water Strategy 2017–2022
17. Youth Strategy 2017–2022

1.3 RIA Results

Based on a review of the National Policy Agenda 2017–2022 and 17 sector strategies, the analysis found that digital/ICT targets included in these planning documents align with (contribute to) 66 of the 106 relevant SDG targets, which is about a 62 per cent alignment (see Table 1 and Figure 5). The review also found that only 18 of the 66 SDG targets addressed have indicators to monitor implementation of the digital/ICT targets. While the assessment points to a fairly good degree of alignment with the SDG targets, there are important gaps that are relevant to Palestine's context, which if addressed can further advance the digital transformation agenda and contribute to progress towards the SDGs. About 40 SDG targets are not addressed by digital/ICT interventions.[20] When analysing the alignment of the digital targets with the five dimensions of sustainable development, the analysis found a stronger alignment of the digital targets with the Peace and People dimensions of sustainable development (68 and 67 per cent, respectively) and weaker alignment with the Prosperity, Planet, and Partnerships dimensions (53, 46, and 15 per cent, respectively) (refer to Figure 6). While a 100 per cent alignment of digital targets across all five dimensions

[20] The relevant SDG targets not addressed include the following: 2.5; 3.5; 4.2; 4.7; 5.3; 5.4; 6.3; 6.4; 6.5; 6.6; 7.3; 8.4; 8.7; 8.10; 9.1; 9.3; 10.7; 11.5; 11.7; 12.1; 12.2; 12.3; 12.6; 12.7; 13.1; 13.2; 14.1; 14.2; 14.3; 14.4; 15.1; 15.6; 15.8; 15.9; 16.7; 16.9; 17.6; 17.16; 17.17; 17.18.

is not expected, it is important to ensure balance across all five dimensions, that is, that alignment of digital targets is not skewed towards a particular dimension/s.

TABLE 1. PERCENTAGE OF ALIGNMENT TO SDGS OF ALL PLANNING DOCUMENTS

SDG	# TARGETS CONSIDERED	# TARGETS ALIGNED	# ALIGNED TARGETS WITH INDICATORS	% ALIGNMENT
1. No Poverty	5	5	1	100%
2. Zero Hunger	5	4	2	80%
3. Good Health and Well-being	9	8	5	89%
4. Quality Education	7	5	2	71%
5. Gender Equality	6	4	2	67%
6. Clean Water and Sanitation	5	1	0	20%
7. Affordable and Clean Energy	3	2	0	67%
8. Decent Work and Economic Development	10	7	5	70%
9. Industry, Innovation, and Infrastructure	5	3	0	60%
10. Reduced Inequalities	5	4	1	80%
11. Sustainable Cities and Communities	7	5	0	71%
12. Responsible Consumption and Production	8	3	0	38%
13. Climate Action	3	1	0	33%
14. Life below Water	4	0	0	0%
15. Life on Land	9	5	0	56%
16. Peace, Justice, and Strong Institutions	9	7	0	78%
17. **Partnerships for the Goals**	6	2	0	33%
TOTAL	**106**	**66**	**18**	**62%**

Figure 5. Digital profile: Percentage of SDG targets covered

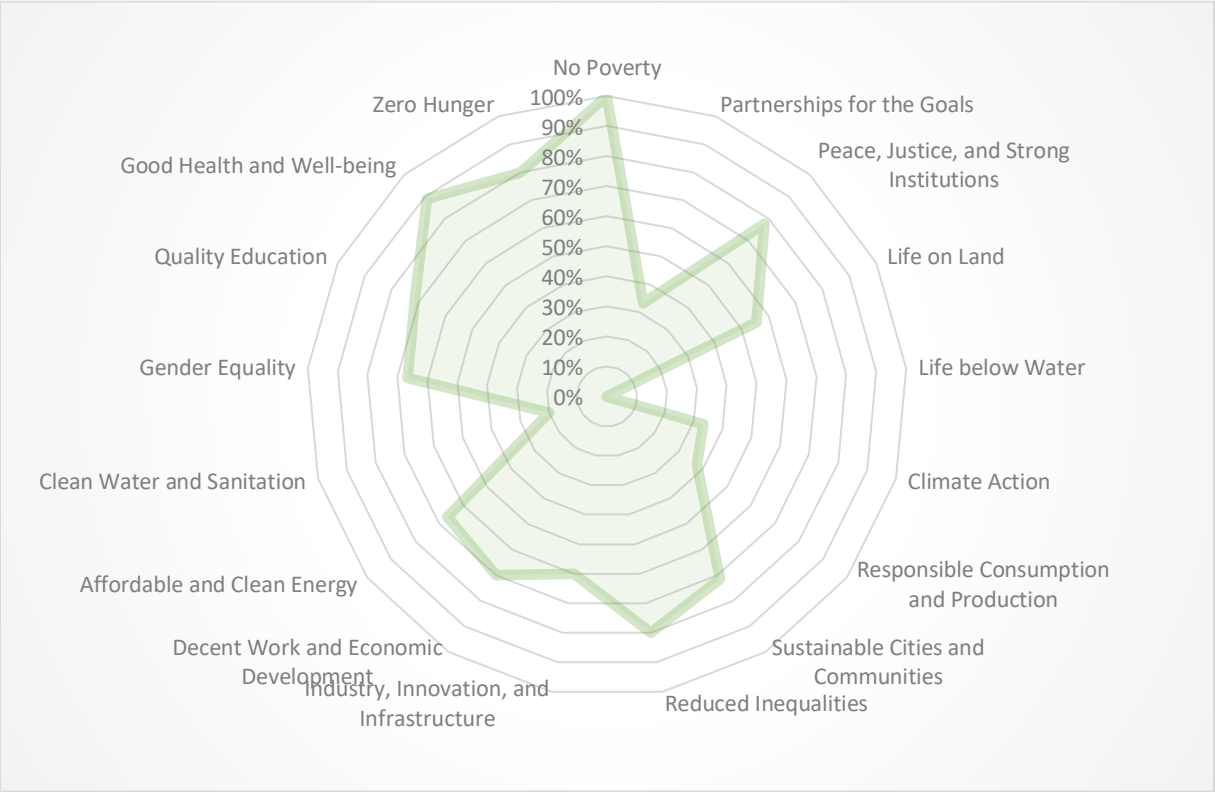
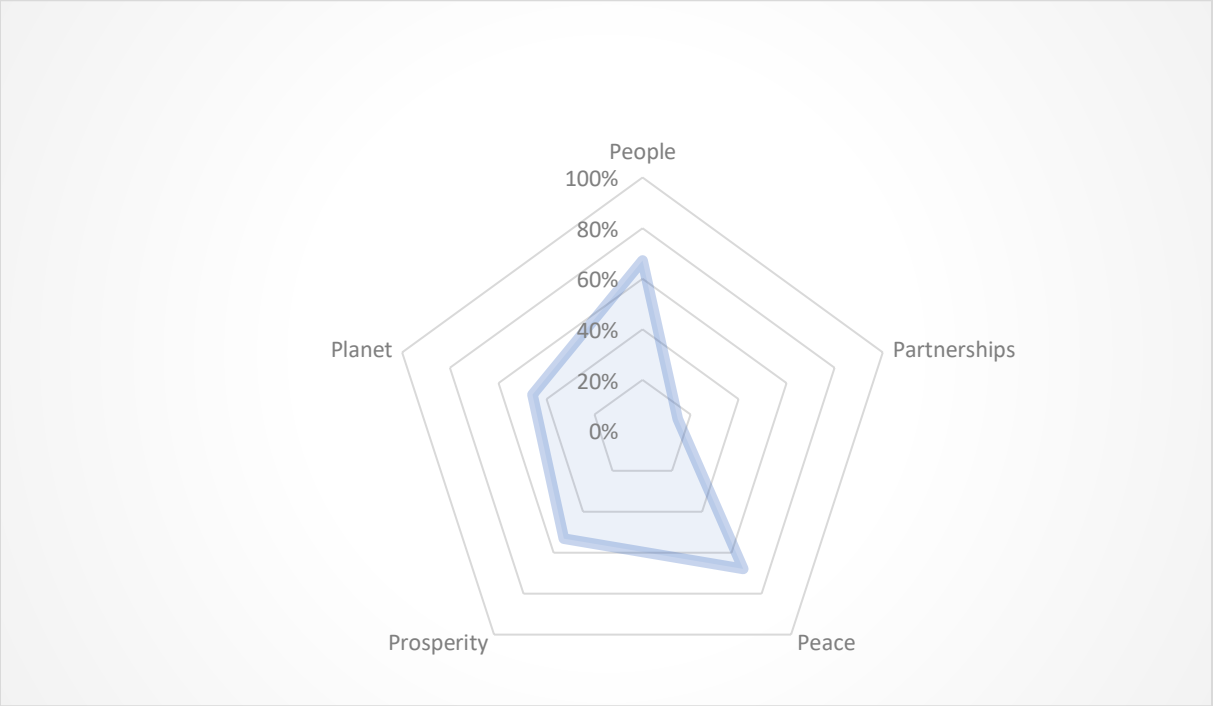


Figure 6. Digital Profile: Percentage alignment with 5Ps of Sustainable Development



1.4 Recommendations

The followings are recommendations based on the analysis of the State of Palestine's National Policy Agenda and 17 sector strategies. It is important to note, however, that given the constraints of the occupation, these are an initial set of recommendations that can be adopted and modified accordingly.

SDG 1: End poverty in all its forms everywhere

While all SDG 1 targets are covered by ICT/digital initiatives as outlined in the National Development Plan (NDP) and sector strategies, advancing the goal of poverty eradication would require more impactful digital targets. Examples include the following:

- **Digital financial inclusion:** Digital financial inclusion plays a major role in promoting development and in helping lift people out of poverty. In terms of accessing/using financial services, large gaps exist between West Bank and Gaza Strip adult populations, as well as between men and women. In 2016 the average age of bank account holders in the West Bank was 1.6 times that of Gaza.[21] Similarly, the number of current account holders in camps is 3.6 per cent lower than that of the rural population and 4.2 per cent lower than that of urban communities.[22] The average age of women using banking financial services and products does not exceed one third of the average age of men.[23] More efforts could be made to enable digital financial inclusion in Palestine.
- **Improve Internet access and 3G penetration:** High-speed Internet access is fundamental to the development of the digital economy, as it allows the population to stay digitally enabled. With about 65 per cent of the population having access to the Internet in 2017,[24] more needs to be done to increase access to those who remain uncovered. Market penetration of 3G networks reached only 12 per cent by 2019,[25] and high-speed Internet access is still nascent, with about 8 fixed-broadband subscriptions per 100 inhabitants in 2018.[26]

SDG 2: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

ICT/digital objectives in the planning documents contribute to four of the five applicable SDG 2 targets, with SDG 2.5 not being covered.[27] Key recommendations include the use of digital technologies to improve agricultural productivity and food security. Examples include the following:

- **Digital technologies to promote agriculture productivity:** The agricultural sector in the State of Palestine contributes to 6.9 per cent of the GDP and includes 6.1 per cent of the labour force.[28]

[21] See http://microfinance-mena.org/wp-content/uploads/2019/01/FI-Study-Summary_en-1.pdf.
[22] Ibid.
[23] Ibid.
[24] See https://www.un.org/unispal/wp-content/uploads/2020/06/WBADLCRPT_010620.pdf.
[25] Note: In Gaza, 3G is still not available to Palestinian providers due to Israeli spectrum restrictions.
[26] See https://www.un.org/unispal/wp-content/uploads/2020/06/WBADLCRPT_010620.pdf.
[27] SDG 2.5: By 2020, maintain the genetic diversity of seeds, cultivated plants, and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.
[28] See http://www.mne.gov.ps/images/economicdevplan21-23.pdf.

The gross crops production has decreased since 2000–2002,[29] with the three-year average value of food production (constant 2004–2006 I$/cap) decreasing from 179 in 2000–2002 to 37 in 2016–2018.[30] Biotech and green ICT – including Geographic Information System (GIS), remote sensing, and smart irrigation – can improve the resilience of agricultural systems by helping farmers with crop monitoring, irrigation management, nutrient application, disease and pest management, as well as yield prediction.

- **Digitalization of the seed bank:** The Union of Agricultural Work Committees (UAWC), one of the oldest non-profit organizations in the State of Palestine, established a seed bank in 2003 to store and document seeds from local plant varieties to protect them from extinction.[31] Seeds of local plant varieties are considered a national natural treasure and a matter of national sovereignty. The seed bank thus plays an important role in preserving and rendering accessible local varieties of seeds. UAWC has also developed local seed committees and agricultural committees in all its targeted communities to create the basis of a network that can share information on best practices through peer-to-peer learning. These committees work in conjunction with the National Committee for Food Sovereignty, also created by UAWC, a network that includes more than 18 local NGOs interested in the conservation of local seeds across the State of Palestine. Efforts can be made by the government to support UAWC in the use of digital technologies to store, monitor schemes, and share information related to the seed bank among the network as well as with the public. This would help contribute to SDG 2.5.

SDG 3: Ensure healthy lives and promote well-being for all at all ages

SDG 3 has all targets covered by ICT/digital initiatives as outlined in the NDP and sector strategies except for SDG 3.5 on strengthening the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol. Key recommendations for more impactful digital interventions that would contribute to SDG 3 include introducing/expanding telehealth platforms (particularly in light of COVID-19), using digital means to raise awareness on non-communicable diseases, and applying the latest digital technologies to improve medical services.

- **Expand telehealth:** Telehealth uses digital technology to improve access to health care services by allowing health care professionals to provide remote diagnosis and treatment as well as to monitor the health of patients. In 2018 almost two-fifths (39 per cent) of patient permit applications to exit Gaza were unsuccessful.[32] In the context of the pandemic, telehealth has been crucial to reducing the possibility of infection by and transmission of COVID-19. For instance, toll-free telemedicine hotlines have become a literal lifeline for Palestine refugees and others in Gaza amid the pandemic, with a daily average of 3,100 calls.[33] It is recommended that the government expand and operationalize telehealth platforms in Palestine across a network of hospitals, care

[29] See http://www.fao.org/faostat/en/#country/299.
[30] Ibid
[31] UNDP, "Union of Agricultural Work Committees: The State of Palestine" (2016), https://www.equatorinitiative.org/wp-content/uploads/2017/05/case_1471988073.pdf.
[32] See http://www.emro.who.int/images/stories/palestine/documents/who_right_to_health_2018_web-final.pdf?ua=1.
[33] Atlantic Council, "How Palestine refugees cope during the coronavirus" (2020), https://www.atlanticcouncil.org/blogs/menasource/how-palestine-refugees-cope-during-the-coronavirus/.

centres, physician offices, and other health facilities. It is further recommended that health care providers receive training on how to provide telehealth services.

- **Establish online platforms to disseminate information on non-communicable diseases:** Morbidity and mortality patterns of Palestinians have shifted from communicable to non-communicable diseases over the past decade. In 2016 the leading causes of mortality were cardiovascular diseases, cancer, cerebrovascular diseases, and diabetes, which were collectively responsible for 65.4 per cent of all deaths among Palestinians.[34] Non-communicable diseases in the West Bank are responsible for 74.9 per cent of all deaths.[35] Online platforms to disseminate information on non-communicable diseases can be established to raise public awareness to support prevention efforts.
- **Application of the latest digital technologies to improve medical services:** Artificial Intelligence (AI) and Big Data are commonly being used in the health care sector across the world. AI is aiding in identifying disease diagnosis and recommending optimal treatment. Robot-assisted surgery is becoming one of the most essential applications of AI in health care, with tremendous benefits – huge cost savings and more effective surgery. Big Data helps improve patient care through the collection of demographic and medical data, such as lab tests, diagnoses, medical conditions, treatment history, etc. Further, it also helps in the prediction of disease incidence and in detecting trends that lead to better health.
- **Digital technologies to support prevention and treatment of substance abuse**: It is estimated that there are 26,500 high-risk drug users in Palestine, representing 1.8 per cent of the male population aged 15 and above.[36] Technology-based interventions (TBI) delivered in an electronic, mobile, or online format could serve as critical tools towards substance use prevention and treatment. TBIs include technology-assisted behaviour therapies, education, recovery support programmes, wellness monitoring, and resources for prevention and information. These interventions can be offered through various modes, including web-based video conferencing, self-directed desktop therapeutic tools, web-based text communication (email, chat, forums), as well as mobile health.

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

While SDG 4 has four of its six targets covered by ICT/digital initiatives as outlined in the NDP and sector strategies, digital interventions are still needed to address the important gaps (SDG 4.2 and SDG 4.7).[37]

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[34] *The Journal of the International Federation of Clinical Chemistry and Laboratory Medicine*, "Laboratory medicine in Palestine" (2018), https://www.ifcc.org/media/477613/ejifcc2018vol29no4pp248-252.pdf.

[35] See https://applications.emro.who.int/dsaf/EMROPUB_2016_EN_18926.pdf?ua=1.

[36] See https://www.unodc.org/documents/middleeastandnorthafrica/Publications/Estimating_the_Extent_of_Illicit_Drug_Use_in_Palestine.pdf.

[37] SDG 4.2: By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education; SDG 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

Additional recommendations include developing quality and affordable online vocational and technical training and supporting e-learning for persons with disabilities. Details are discussed below.

- **Introduce digital technologies to enhance access to quality early childhood development and pre-primary education:** In a technology-advanced world, incorporating appropriate technology into pre-primary education serves as a powerful tool for helping children develop foundational skills. There are many benefits of incorporating technology in early childhood education. Preschool technology tools may promote an early foundation for digital literacy, enabling children to learn appropriate ways of using technology for constructive learning activities. The use of technology enables teachers to have access to more innovative and improved teaching methods, which allow them to promote learning and create an active learning environment for children. Assistive technologies can promote the development of children with special needs, ensuring an inclusive education.
- **Support the development of digital content and resources** to ensure that all learners (both in formal and non-formal education) and teachers acquire the knowledge and skills needed to promote sustainable development, including through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.
- **Introduce affordable and quality online training:** Enrolment in vocational and technical education remains low at 2.6 per cent in 2016.[38] Affordable and quality online training for employment and entrepreneurship can boost enrolment and help equip Palestinians with vocational capacities. Recognition and certification of online training is also recommended, as appropriate.
- **Support inclusive e-learning for persons with disabilities**: Illiteracy rates among persons with disabilities (10 years and older) in the State of Palestine reached 32 per cent as of 2019.[39] E-learning developed correctly can support persons with disabilities in the learning process, providing them with new ways to engage with content. This allows for new learning opportunities in improving reading, writing, and comprehension skills.

SDG 5: Achieve gender equality and empower all women and girls

SDG 5 has four of the six targets that are covered by ICT/digital initiatives as outlined in the NDP and sector strategies. Recommendations would include addressing the relevant gaps on SDG targets 5.3[40] and 5.4[41], as well as introducing more impactful digital/ICT interventions that cover the other SDG 5 targets. These are discussed below.

[38] See http://www.moehe.gov.ps/LinkClick.aspx?fileticket=ntpr8_qoiS8%3D&tabid=209&portalid=0&mid=893.
[39] See: http://www.pcbs.gov.ps/site/512/default.aspx?lang=en&ItemID=3607#:~:text=Data%20indicated%20that%20illiteracy%20rates,compared%20to%2046%25%20among%20females.
[40] SDG 5.3: Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation.
[41] SDG 5.4: Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.

- **Promote inclusive use and development of digital technologies:** Ensure that all women and girls can engage with new digital technologies both as developers as well as users in order to enhance human capabilities and inclusive innovation. Special attention should be placed in ensuring that women and girls with disabilities can engage with new technologies.
- **Raise awareness on gender-based violence through digital means**: Gender-based violence (GBV) undermines the dignity, health, and security of its victims, and is a key protection concern in Palestine. A 2019 survey carried out by the Palestinian Central Bureau of Statistics revealed that 29 per cent of Palestinian women, or nearly one in three, has reported physical, psychological, sexual, social, or economic violence by their husbands at least once during the preceding 12 months,[42] and that fewer than 1.5 per cent of women who reported violence by their husbands sought counselling or legal assistance.[43] Patriarchal gender norms and traditions contribute to the acceptance of GBV. Digital tools can be used as a means to raise public awareness on GBV and change beliefs and attitudes about equality, respect, and relationships. In addition, information on counselling, legal, and health services can be made available online for ease of access.
- **Tackle child and early marriage through digital advocacy:** While 2018 data of registered marriages and divorce contracts indicate a decline in the average age of early marriage for both females and males (under 18 years) in Palestine, around 20 per cent of the total number of married females in the same year were under 18 years.[44] Given that unregistered marriages are not captured in the dataset, the average age of early marriage is likely higher. Digital media tools can be used to raise awareness on the negative consequences of child marriage and to address social norms related to women's and men's roles. Teachers can be trained to promote a gender transformative approach to teaching that tackles the underlying social structures, policies, and broadly held social norms that perpetuate and legitimize gender inequalities.
- **Address issues of gender equality and unpaid care work:** Caring for children, the sick, and the elderly as well as maintaining households is instrumental for society's well-being. However, women are disproportionately responsible for unpaid and domestic work, which limits their time to invest in productive economic activities. Women in the Gaza Strip who do not engage in paid work spend an average of 12 hours daily on unpaid care and domestic work, whereas men without paid employment spend an average of five hours.[45] Disproportionate distribution of unpaid care and domestic work, coupled with weak infrastructure and human capital investment, perpetuates intersectional inequality. Redistribution of unpaid care work requires investing in women's human capital through education as well as advocacy to enhance the recognition and value of unpaid work. In this regard, efforts can be made to support women engaged in unpaid work in accessing relevant training *online* given that they may have limited mobility to attend in-person training due to care responsibilities and domestic chores. Digital advocacy can be supported to raise awareness of the public, including in educational institutions, on the value of unpaid care work and uneven gender roles, and a need for a more just and equitable gender division of labour.
- **Promote women and girls digital empowerment**: Only 19 per cent of Palestinian women participate in the labour market; and the proportion of women in decision-making positions as

[42] See http://www.pcbs.gov.ps/Downloads/book2480.pdf.
[43] Ibid.
[44] See http://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=3707.
[45] Rapid Care Analysis: A contextualized tool for Occupied Palestinian Territory (openrepository.com).

members of the cabinet (14 per cent), active ambassadors (11 per cent), employees in the public (civil) sector who are general directors (13 per cent), members of the Palestinian National Council (11 per cent), and members of a local council (20 per cent) remain low.[46] ICT and digital skills training can empower women and girls economically and socially, helping to ensure their essential and equal role in economic, political, and public life. Digital skills training can be imparted both in formal and non-formal education. Besides the unified gender-sensitive online database that has been established to promote entrepreneurship, particularly for women and youth, it is recommended that a digital platform to track, monitor, and share employment opportunities with women be established.

SDG 6: Ensure availability and sustainable management of water and sanitation for all

Significant gaps remain in the coverage of SDG 6 targets with only one digital intervention that contributes to SDG 6.1 (universal and equitable access to safe and affordable drinking water for all). Digital interventions can contribute towards achieving SDG targets 6.3,[47] 6.4,[48] 6.5,[49] and 6.6.[50] Some of these interventions are discussed below.

- **Improve water quality through digital technologies:** Deterioration of water quality in the State of Palestine, particularly in Gaza, is a key health challenge that requires urgent action. Groundwater resources are impacted due to infiltration of untreated wastewater from leakages in the infrastructure, overloaded treatment plants, and effluent discharged directly into the environment. More than 97 per cent of the water pumped from the coastal aquifer in Gaza does not meet the water quality standards of the World Health Organization.[51] While action at the policy and implementation levels is required to address this challenge, digital technologies can help in monitoring water quality and in providing real-time monitoring data to inform necessary action. Smart sensors for monitoring can be utilized to improve water quality by performing the online measurement of the fundamental parameters of water quality, including pH, conductivity, dissolved oxygen, turbidity, ammonia, phosphorus, nitrate, chemical oxygen demand, metal ions, etc.[52]
- **Smart water management**: Palestinians continue to face severe water shortages with the decline in access to improved water sources from 90.9 per cent in 2000 to 58.4 per cent in 2015,[53] while

[46] Ibid.
[47] SDG 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.
[48] SDG 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
[49] SDG 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
[50] SDG 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.
[51] See https://unstats.un.org/unsd/environment/FDES/EGES6/Session%202_15Water%20statistics_Palestine.pdf.
[52] ITU-T Focus Group on Smart Sustainable Cities (2014). Smart Water Management in Cities.
[53] See https://www.arabdevelopmentportal.com/datahighlighted/improved-water.

the proportion by governorate differs from 99.9 per cent to 6.2 per cent.[54] Digital technologies including remote sensing can be used to monitor water use to support better water management. For example, sensors can be used to optimize the water used in irrigation, measuring parameters such as air temperature, air humidity, soil temperature, soil moisture, atmospheric pressure, and rainfall.

SDG 7: Ensure access to affordable, reliable, sustainable, and modern energy for all

ICT/digital targets as outlined in the NDP and sector strategies contribute to two of three SDG 7 targets (7.1 and 7.2). An important contribution can be made to SDG 7.3 on improvement in energy efficiency, as discussed below.

- **Improve energy end-use and system efficiency through digital technologies:** The State of Palestine has set an ambitious target to reduce total electricity consumption by 500 MWh per year.[55] Digital technologies have the potential to improve both energy end-use and system efficiency. Digital technologies can improve the efficiency of energy end-uses such as lighting, heating/cooling, and water heating, as well as unlock distributed sources of flexible load, generation, and storage. As a result, digital technologies can increase the efficiency of the entire energy system by reducing the need for expensive energy-intensive sources of power to cater for peaks in demand, reducing energy transmission and distribution losses, and helping bring more renewables into the generation mix.

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all

SDG 8 has almost all targets covered by ICT/digital initiatives as outlined in the NDP and sector strategies, except for 8.4,[56] 8.7,[57] and 8.10.[58] However, stronger digital interventions are needed to promote inclusive and sustainable economic growth, including the following:

- **Advance a technology-based services sector:** The service sector has grown steadily in Palestine over recent decades, and now accounts for the largest share in terms of value added (60 per cent of GDP),[59] number of firms, and employment. This sector holds significant influence on the growth of labour productivity, which averaged about -0.43 per cent from June 2013 to September 2020.[60] Hence, to increase the sector's contribution to boost low labour productivity, significant efforts

[54] See http://www.pcbs.gov.ps/portals/_pcbs/PressRelease/Press_En_Preliminary_Results_Report-en.pdf.
[55] See http://documents1.worldbank.org/curated/en/851371475046203328/pdf/ACS19044-REPLACEMENT-PUBLIC-FINAL-REPORT-P147961-WBGaza-Energy-Efficiency-Action-Plan.pdf.
[56] SDG 8.4: Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead.
[57] SDG 8.7: Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms.
[58] SDG 8.10: Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all.
[59] See https://data.worldbank.org/indicator/NV.SRV.TOTL.ZS?locations=PS.
[60] See https://www.ceicdata.com/en/indicator/palestinian-territory-occupied/labour-productivity-growth.

should be made to substantially increase investment in digital technologies and promote technology-based services. Doing so requires improvements in business regulations and competition, entrepreneurship financing, skills, and infrastructure.

- **Apply digital technologies to promote sustainable consumption and production**: The Government of Palestine has introduced numerous interventions to target sustainable consumption and production, with the aim of altering the behaviour of Palestinian businesses and consumers, including a Value Added Tax of 16.5 per cent and income tax on supplied goods and services, as well as a Polluter Pays Principle introduced into environmental law that obliges companies that break environmental legislation to pay to rectify any damage.[61] In addition to these interventions, digital technologies can play a critical role in promoting sustainable consumption and production. Two major opportunities include: (i) monitoring supply chains accurately to create transparency in production, thus helping to enable sustainable production; and (ii) optimizing processes to increase productivity while reducing energy consumption and material usage and emissions. Increased dematerialization and virtualization as well as innovative ICT applications enable sustainable production and consumption. Cloud computing, smart grids, smart metering, and reduced energy consumption of ICTs all have a positive impact. However, ICTs themselves require energy consumption, thus calling for effective policies to ensure the negative impacts of ICTs, such as e-waste, are minimized.
- **Promote entrepreneurship and skills development through online training:** While the State of Palestine's planning documents include reference to supporting entrepreneurial projects and initiatives of a technological nature, it is important to ensure that skills-development training can be made available online. This can help to broaden access, including for micro-small and medium enterprises (MSMEs) and others who face issues related to mobility. It is also critical to ensure accreditation of distance learning.
- **Invest in technologies to combat child labour:** Despite Palestinian laws that make 10 years of primary education compulsory and free for children and that prohibit employing children under 15 and employing children aged 15 to 18 in hazardous work, child labour has increased to 3.4 per cent.[62] Innovative technologies can help to eliminate child labour and end abusive practices, such as by monitoring supply chains.
- **Strengthen the capacity of domestic financial institutions to expand access to banking, insurance, and financial services for all:** Digital financial inclusion plays a major role in promoting development and in helping lift people out of poverty. In terms of accessing/using financial services, large gaps exist between West Bank and Gaza Strip adult populations, as well as between men and women. In 2016 the average age of account holders in the West Bank was 1.6 times that of Gaza.[63] Adult camp residents also face challenges of financial exclusion, where the number of current account holders is 3.6 per cent lower than that of the rural population and 4.2 per cent lower than that of urban communities.[64] The average age of women using banking financial

[61] See https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf.
[62] Ibid.
[63] See http://microfinance-mena.org/wp-content/uploads/2019/01/FI-Study-Summary_en-1.pdf.
[64] Ibid.

services and products does not exceed a third of the average age of men.[65] More efforts should be made to enable digital financial inclusion for all in Palestine.

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation

While the planning documents include reference to the establishment of innovation and scientific research centres to promote sustainable industrialization and foster innovation, critical interventions that could also help advance SDG 9 are not addressed. These include interventions related to 9.1,[66] 9.3,[67] and 9.4[68] as discussed below.

- **Develop quality, reliable, sustainable, and resilient digital infrastructure with a focus on affordable and equitable access for all:** Digital infrastructure is critical to the future expansion of the digital economy in the State of Palestine. There are several challenges in the development of digital infrastructure that need to be resolved bilaterally with Israel, along with a need for internal reforms.[69] Israeli restrictions on access to spectrum resources, sites needed for network coverage, and on the import of certain telecom equipment are key challenges that need to be addressed.[70] The use of new technologies and existing infrastructure opportunities can increase the potential to accelerate expansion of broadband coverage to improve the reliability of connections and reduce their cost. It is also critical for the government to advance the digital economy through developing a comprehensive strategy for the sector, which prioritizes a new telecommunications law aligned with international best practice and establishing an independent regulator for the sector.[71] Along with the development of digital infrastructure, it is also paramount to ensure equitable and quality access for all. Currently, only 58 per cent of household have Internet access, and 58 per cent of the population are covered by mobile networks with at least 3G capability.[72] In addition, the fixed-broadband subscriptions by speed tiers are as follows: 256 Kbps to 2 Mbps: 0.4 per cent; 2 to 10 Mbps: 41.6 per cent; and 10 Mbps or more: 58 per cent.[73] Given these low statistics in terms of access to quality digital infrastructure, much remains to be done.
- **Promote digital financial inclusion to increase the access of small and medium enterprises (SMEs) to financial services, including affordable credit, and their integration into value chains**

[65] Ibid.
[66] SDG 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.
[67] SDG 9.3: Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.
[68] SDG 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.
[69] See http://documents1.worldbank.org/curated/en/844141590600764047/pdf/Economic-Monitoring-Report-to-the-Ad-Hoc-Liaison-Committee.pdf.
[70] Ibid.
[71] Ibid.
[72] See https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/arab-digital-development-report-2019-english_0.pdf.
[73] Ibid.

and markets: SMEs and MSMEs are key contributors to economic activity as an important source of employment, growth, and innovation in Palestine. The State of Palestine's National Strategy for Financial inclusion 2018–2025 recognizes that the level and quality of financial inclusion must be substantially increased, particularly for micro-small and medium enterprises.[74] A majority of MSMEs are forced to rely on self-finance or informal sources to meet their requirements. However, neither self-finance nor informal sources enable them to fully harness their growth potential; hence, their overall contribution to economic growth and employment generation remains limited. The absence of service providers that supply mobile banking services based on mobile phones is a major challenge, given the lack of any mobile financial services provider in the market. This has been one of the reasons for the low level of financial inclusion in the country. Another key challenge is the insufficiency of credit guarantee schemes to expand the supply of credit to MSMEs. Greater efforts should be made to address these challenges through enhancing the legal and technical infrastructure for digital financial services, including introducing Fintech (digital) credit that uses modern technology to digitize at least some aspect of the credit extension process.

- **Increase resource-use efficiency through digital technologies:** Digital technologies offer new opportunities to increase resource use efficiency. As mentioned under SDG 6, a key challenge in the State of Palestine is severe water shortages. Digital technologies, including remote sensing, can be used to monitor water use to support better water management. For example, sensors can be used to optimize the water used in irrigation, measuring parameters such as air temperature and humidity, soil temperature and moisture, atmospheric pressure, and rainfall. The treatment of wastewater through the application of digital technologies also opens remarkable channels for efficient energy use and saves resources to minimize the impact on the environment. In addition, smart grids and advanced metering infrastructure can be used to improve performance and unleash clean-energy markets.

SDG 10: Reduce inequality within and among countries

While almost all relevant targets of SDG 10 are covered by ICT/digital initiatives, with the exception of 10.7, the following interventions are recommended to help advance SDG 10 and related targets.

- **Develop an integrated and digital social protection information system:** This is a critical step in building/strengthening a national social protection system as it enables the flow and management of information both within the social protection sector as well as across sectors. Through the use of dynamic and real-time data and information exchange, the government will be equipped to identify those populations who are in need, foster their enrolment in social protection programmes, provide tailored benefits and services, as well as monitor programme impacts and track and plan expenditures.
- **Provide refugees with access to technologies to facilitate their integration and enable them to become productive members of society:** In 2017 about 39 per cent of refugees in the State of

[74] See https://www.pma.ps/Portals/0/Users/002/02/2/Publications/Financial%20Inclusion%20publication/Palestine%20Financial%20Inclusion%20Strategy.pdf.

Palestine were living in poverty.[75] The labour force participation rate for refugees aged 15 years and above was 47 per cent in 2018. Providing refugees with access to mobile phones and the Internet is essential to enable them to access a wide range of vital information and social services, as well as employment and training opportunities. In terms of the broader refugee management process, data processing technology combined with biometrics can be used to lower administrative costs and enhance systems integration and coordination.[76]

SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable

There are a few relevant SDG targets that are unaddressed by digital interventions, including SDG 11.5[77] and SDG 11.7.[78] Further, while SDG 11.6 has a number of digital interventions that could contribute to its achievement, more effective interventions are needed. A few of these interventions are discussed below.

- **Apply digital technologies to improve municipal waste management and air quality in cities:** Currently, 75 per cent of Palestinians live in urban areas.[79] The generation of municipal solid waste has increased as a result of high levels of urbanization, with the number of dumping sites reaching 189. [80] These sites are located near residential areas, with burning being the main method for waste disposal,[81] which adversely affects the quality of urban life in terms of air pollution and limited access to green spaces. Digital interventions can aid in addressing some of these challenges. For instance, data analytics can provide accurate projections on total waste generated, waste type, and identification of high waste generation areas to enable more effective planning and management. Digital technologies can also aid in the control, management, and prediction of air pollution in cities through the use of sensors and IoT (Internet of Things) platforms.
- **Utilize digital technologies to reduce water-borne diseases:** Ensuring the availability and sustainable management of water for all is integral to sustainable development. Currently, 1.2 million people in Gaza – two thirds of Gaza's population – have no running water.[82] The Coastal Aquifer, which supplies almost all of Gaza's water, is being pumped at three times its sustainable capacity, resulting in seawater and raw sewage contamination. About 97 per cent of the water drawn from the aquifer is undrinkable, and only 10 per cent of Gaza's population has access to safe drinking water.[83] As a result, contaminated water and a lack of sanitation are responsible for 26 per cent of all disease in Gaza. Without proper treatment, the pollution is projected to become irreversible by 2022. In an attempt to seek alternate sources of water, 85 per cent of the

[75] See http://www.badil.org/phocadownloadpap/Statistics/(PCBS)The-International-Day-of-Refugees-2019-eng.pdf.
[76] See https://www.odi.org/sites/odi.org.uk/files/resource-documents/12395.pdf.
[77] SDG 11.5: By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.
[78] SDG 11.7: By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.
[79] See https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf.
[80] See https://unhabitat.org/sites/default/files/documents/2019-05/profile_for_the_state_of_palestine.pdf.
[81] Ibid.
[82] See https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf.
[83] Ibid.

population in Gaza is reliant on private desalination services, which charge up to five times the cost of water from municipal networks.[84] About 68 per cent of water from these services is contaminated through production, transportation, or home storage. While the use of digital technologies cannot help to address the issue of water availability, it can help in detecting bacteria in water sources, which can inform water treatment plants and service providers. Early detection of bacteria could enable a decrease in the number of waterborne diseases.

SDG 12: Ensure sustainable consumption and production patterns: More than half of the relevant SDG targets under SDG 12 are not covered by digital targets, including 12.1,[85] 12.2,[86] 12.3,[87] 12.6,[88] and 12.7.[89]

Rapid urbanization and unsustainable industrialization; shortage of water due to Israel's control of water resources; increased generation of solid waste, wastewater, and hazardous waste; desertification and soil contamination; air pollution; deteriorated coastal zone and maritime environment; rising energy demand; and significant environment-related public health problems all call for urgent action to address unsustainable consumption and production. This will require transitions in agriculture, industry, energy, construction, and transportation. The government has initiated several actions in this regard as outlined in the Sustainable Consumption and Production Action Plan of Palestine 2016.[90] The use of digital technologies can make a significant contribution to achieving the sustainable consumption and production goals of Palestine. Some of these possible interventions are discussed below.

- **Promote the use of digital traceability tools by industry to improve sustainable production:** Digital traceability technologies have the potential to enhance transparency and traceability that can be leveraged to create more resilient, efficient, sustainable, and circular supply chains. Without visibility into how materials and goods enter and move across supply chains, it is almost impossible for companies to increase their agility and effectively monitor inputs and outputs to comprehensively improve the sustainability of their supply systems.
- **Promote the use of digital technologies to reduce food loss and food waste:** Food loss and food waste is a challenge in the State of Palestine. A 2017 study that focused on the post-harvest handling, storage, and distribution of tomatoes and cucumbers in the Tulkarem Governorate of Palestine estimated an overall loss and waste rate of 21 per cent from harvest to retail.[91] This implies that 5,610 tons of cucumber and 2,915 tons of tomatoes produced in the Tulkarem Governorate are wasted every year.[92] By introducing technology and digitalizing the food supply

[84] Ibid.
[85] SDG 12.1: Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries.
[86] SDG 12.2: By 2030, achieve the sustainable management and efficient use of natural resources.
[87] SDG 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.
[88] SDG 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.
[89] SDG 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities.
[90] See https://wedocs.unep.org/bitstream/handle/20.500.11822/33982/SCPNAP.pdf?sequence=1&isAllowed=y.
[91] See https://www.cesvi.org/wp-content/uploads/2017/12/Food-Loss-and-Waste-in-Palestine-Report-1.pdf
[92] Ibid.

chain, action can be taken towards reducing the amount of food loss and waste within the industry. For instance, IoT can support and improve supply chain efficiencies. Based on the use of interconnected and interrelated systems and processes, IoT enables the food industry to have access to key data around the supply, production, and management of produce, which can help reduce food waste.

- **Advance digital transformation of public procurement:** Public procurement is regulated by Law No. 8 of 2014, which applies to both the central and municipal levels of government in Palestine.[93] While the law became effective on 1 July 2016, many aspects remain unimplemented. Digitally transforming public procurement systems can enhance efficiency, accountability, and transparency. In the age of Big Data, digital procurement is also crucial in enabling the government to make data-driven decisions about public spending. With digital tools, public spending should become more transparent, evidence-oriented, optimized, streamlined, and integrated with market conditions. Digitally transforming public procurement can also accelerate national development objectives, including enhancing public service delivery. It is also important to put in place a procurement monitoring and reporting system within government for ensuring value for money and for promoting fiduciary integrity. Information on procurement processes and results – including data on what has been procured, the procurement methods, the amounts of contracts, and the names of contracts winners – are currently maintained separately by more than 100 public procuring entities at the central level, including ministries and authorities.[94]

SDG 13: Take urgent action to combat climate change and its impacts

The impacts of global climate change have already become visible in Palestine, which has experienced an increase in temperatures over the past fifty years.[95] Climate projections indicate that by mid-century the temperature will increase by between 1.2°C and 2.6°C, modifying the water cycle as average monthly precipitation may fall by 8–10 mm by the end of the century.[96] Water scarcity has been the most serious impact of climate change in Palestine. Climate change is also creating challenging agricultural conditions that could affect productive capacity. The propensity for dangerous climate-driven events such as storms, forest fires, flooding, and desertification is expected to increase.[97] It is critical to employ digital technologies to mitigate the effects of climate change and to build a low-carbon economy in Palestine. A review of the planning documents found that only one of the three SDG 13 targets (13.3[98]) is covered by ICT/digital initiatives.[99] Interventions may include the following:

[93] See https://www.pefa.org/sites/pefa/files/2020-03/WBGS-Jun19-PFMPR-Public%20with%20PEFA%20Check_0.pdf.
[94] Ibid.
[95] See https://www.un.org/unispal/document/state-of-environment-and-outlook-report-for-the-opt-2020-un-environmental-program-report/.
[96] Ibid.
[97] See https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf.
[98] SDG 13.3: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.
[99] SDG 13.1 and SDG 13.2 are not addressed by digital/ICT initiatives. SDG 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries; SDG 13.2: Integrate climate change measures into national policies, strategies and planning.

- **Mainstream the use of digital/ICT technologies in planning and sector strategies to mitigate climate change.** Digital technologies provide an immense opportunity to contribute to climate action through helping to measure and track carbon emissions, analysing and optimizing all manner of emitting processes across industries to reduce emissions, and communicating issues related to climate change to raise awareness. For instance, adaptive AI algorithms, sometimes in combination with IoT sensor data, can optimize the efficiency of water and energy usage across sectors. Hence, it is important to mainstream the use of digital technologies in planning and sector strategies.
- **Apply digital technologies to strengthen resilience and adaptive capacity to climate-related hazards and natural disasters.** Digital technologies can contribute to ensuring hazard resilience, enabling populations to be warned of impeding disasters, and alerting authorities of when disasters are likely to unfold.

SDG 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development

A review of the planning documents found that none of the five relevant SDG 14 targets are covered by digital/ICT interventions. About 75 per cent of Gaza's 40-kilometer coastline is affected by pollution.[100] Shortage of electricity causes daily blackouts of at least 16 hours, which paralyze basic services, particularly sewage treatment and sanitation systems.[101] Thus raw sewage is dumped directly into the Mediterranean. Reducing pollution and enhancing wastewater management, treatment, and reuse – both critical to cleaning up Gaza's coastline – are key government targets. To this end, the Palestinian Government and its partners aim to continue developing wastewater management in order to reduce and eventually reverse the pollution of the Gaza coastline.[102] The following recommendation on the use of digital technologies can support the government's aim.

- **Apply digital technologies for monitoring ocean health:** Digital technologies can help in monitoring ocean health as well as the activities that impact the oceans. For instance, digital technologies can assist in monitoring acidification levels. By having better visibility into the human impact on oceans and marine resources as well as habitats related to the ocean, action plans, policies, and frameworks supporting SDG 14 can be designed and implemented.
- **Apply digital technologies to reduce marine pollution, including plastic debris and nutrient pollution:** Digital technologies can detect and remove marine pollution, and monitor and respond to ocean changes, while raising awareness among populations on marine conservation.

SDG 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

[100] See https://reliefweb.int/report/occupied-palestinian-territory/gaza-s-environment-deteriorates-untreated-wastewater-continues.
[101] Ibid.
[102] See https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf.

The analysis reveals that nearly half of the relevant SDG 15 targets are not covered by ICT/digital initiatives.[103] The State of Palestine's Fifth National Report to the Convention on Biological Diversity indicates that 70.7 per cent of the total forest area of the West Bank has been damaged, and that no more than 29.3 per cent of it remains.[104] Further, the State is experiencing a dramatic loss of biodiversity, with 24 endangered species as a result of increasing human activity and illegal Israeli settlements, climate change, and the construction of the Wall.[105] The Government of Palestine is taking action to address these challenges, despite the Israeli impediments. In addition to policy and programme interventions, the use of digital technologies can play a significant role in the sustainable use of terrestrial ecosystems and protection of biodiversity. A few interventions are outlined below.

- **Apply digital technologies to improve monitoring of ecosystems:** Digital technologies can play an important role in the conservation and sustainable use of terrestrial ecosystems and the prevention of biodiversity loss through improved monitoring and reporting, which can lead to increased accountability. Big Data can be used to analyse short- and long-term trends to inform mitigation activities. Digital technologies can also be used to improve efficiencies in land restoration via sensors, data collection, and analysis.
- **Apply digital technologies to address the spread of invasive alien species:** The State of Palestine has identified about 50 invasive plant species, which pose a threat to the environment and to human health.[106] The application of Big Data stored in the cloud (e.g., taxonomic, biogeographic, or ecological information) can enable the generation of detailed biological models that can provide improved forecasting on the spread of invasive species. Technologies such as Unmanned Aerial Vehicles can be used to monitor the spread of invasive species.
- **Apply digital technologies to ensure fair and equitable sharing of the benefits arising from the utilization of genetic resources:** Digital technologies can support the timely and accurate sharing of genetic resource information. However, a key constraint towards achieving a more meaningful benefit sharing is that the State of Palestine does not have national legislations or administrative mechanisms pertaining to access to genetic resources and associated traditional knowledge and benefit sharing from their utilization.[107] While the State has ratified the Convention on Biological Diversity and the Cartagena Protocol on Biosafety in 2014, it has not signed the Nagoya Protocol on Access and Benefit Sharing of Genetic Resources.[108]

[103] The SDG 15 targets that are not covered by digital/ICT interventions include: SDG 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements; SDG 15.6: Ensure fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources; SDG 15.8: By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species; and SDG 15.9: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.
[104] See https://www.cbd.int/doc/world/ps/ps-nr-05-en.pdf.
[105] See https://sustainabledevelopment.un.org/content/documents/20024VNR2018PalestineNEWYORK.pdf.
[106] See http://www.pcbs.gov.ps/portals/_pcbs/PressRelease/Press_En_4-6-2020-env-en.pdf.
[107] See https://www.cbd.int/doc/world/ps/ps-nr-05-en.pdf.
[108] Ibid.

SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels

Strengthening the rule of law and access to justice is a national priority of the Palestinian Government. To this end, the government created a committee that aims to unify the justice system in the north and south of the West Bank, as well as to create a national strategy to provide legal representation to all citizens in court. The government has been developing the infrastructure needed to increase the capacity of the judicial system, as well as using ICT systems in the judicial system that makes accessing the system more efficient.

While a majority of the relevant SDG 16 targets are covered by ICT/digital initiatives, more can be done to advance the remaining targets (16.7[109] and 16.9[110]) and support the government's aim of achieving SDG 16. These are discussed include the following:

- **Apply digital technologies to ensure responsive, inclusive, participatory, and representative decision-making at all levels:** Digital technologies are key to increasing data availability and accessibility, which in turn can enable achievement of responsive, inclusive, participatory, and representative decision-making.
- **Apply digital technologies to support legal identity for all:** Lack of legal identity often results in limited access to basic public services, including education and health care. It also creates a huge obstacle to economic empowerment. People without official identification often struggle to access financial services, such as opening a bank account or obtaining financial benefits. The Government of Palestine has taken important steps in this regard. For example, the Ministry of Interior, in partnership with the Ministry of Health and UNDP, launched a digital birth and death registration system that will strengthen civil registration. However, more need to be done to provide legal identity to the many individuals who do not have it. Biometrically-enhanced national identity registers and accompanying national ID card systems can be developed as a means to tackle this issue and to help achieve SDG 16.9.
- **Apply digital technologies to reduce corruption and bribery in all their forms:** Reducing corruption and bribery can be largely enabled by digital technologies through the identification of patterns and anomalies, biometric identification to prevent fictitious and fraudulent activities, and the promotion of public procurement transparency.

SDG 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

Although SDG 17 is a complex goal encompassing diverse targets related to financing, trade, technology, capacity-building, and international cooperation, there is wide scope for digital interventions. Of the relevant SDG 17 targets, digital technologies can contribute to the following in Palestine:

- **Enhance North-South, South-South, and triangular cooperation on access to science, technology, and innovation**: Digital technologies and digital access can help facilitate the sharing

[109] SDG 16.7: Ensure responsive, inclusive, participatory and representative decision-making at all levels.
[110] SDG 16.9: By 2030, provide legal identity for all, including birth registration.

and exchanging of knowledge and information between the State of Palestine and other countries of the North and of the South.

- **Enhance global and multi-stakeholder partnerships for sustainable development:** Digital technologies can enable the forging of multi-stakeholder partnerships and the sharing of knowledge and expertise through digitally accessible platforms.
- **Enable effective, public, public-private, and civil society partnerships:** Digital technologies can enable the creation of effective public-private partnerships by building networks and digital marketplaces.
- **Enable the availability of high-quality data:** Digital technologies can support the wide and equitable availability of high-quality data through digital access and cloud technologies.

Indicators

Based on the analysis, only 27 per cent of the digital/ICT targets mentioned in the planning documents have clear indicators to measure progress. An important recommendation for the Government of Palestine is to ensure that the implementation of digital/ICT interventions are measured and monitored, and that these indicators are clearly reflected in national plans and sector strategies alongside their targets.

Cross-sectoral linkages

Given the cross-sectoral nature of many of the digital/ICT interventions, it is important to ensure effective governance, coordination, and coherence across government departments and between stakeholders, including the private sector, academia, and civil society in planning, implementation, and monitoring.

Negative externalities

While digital technologies can make an immense contribution to advancing all 17 SDGs as highlighted above, they can also be deployed in ways that run counter to the SDGs by expanding the digital divide and fuelling inequality, damaging the environment and increasing health risks through the generation of e-waste, and contributing to climate change through an increase in energy consumption. Enhancing the positive impacts of digital technologies needs to go hand in hand with minimizing any negative impacts.

Digital Landscape Assessment

- Rapid Integrated Assessment
- Digital Maturity Assessment
- Accelerator and Bottleneck Assessment

2 Digital Maturity Assessment

2.1.1 Objectives

The aim of the assessment was to evaluate the current digital maturity of the public sector of the State of Palestine, draw general findings, and offer suggestions for further activities in 12 e-government focus areas:

1. Political will and support
2. Coordination
3. Financing model
4. Legal framework
5. Digital databases, interoperability, secure data exchange
6. Secure digital identity and digital signature
7. Digital skills
8. Access to services, awareness-raising
9. E-participation, e-democracy
10. Information security
11. Telecommunications and digital infrastructure
12. International cooperation

The current Digital Maturity Assessment report provides the State of Palestine with a good understanding of its current digital maturity and can be used as the foundation and inspiration for strategic national documents on digital transformation. The report also serves as an input to the Digital Landscape Assessment tool developed by UNDP in cooperation with the e-Governance Academy Foundation, which helps identifying digital entry points for acceleration towards achieving SDG goals.

2.1.2 Methodology

The assessment was conducted in six steps.

1. **Preliminary research**, consisting of a review of existing policy documents, strategies, government political agenda, public reports, statistical sources, etc.
2. **Online introductory seminar** for key officials and stakeholders to present the project, content, and objectives of the Digital Maturity Assessment, as well as the expected benefits to stakeholders and the input expected from them.
3. **Digital Maturity Assessment questionnaires** were filled in at the central and municipal levels. A comprehensive digital maturity questionnaire was filled in by the Ministry of Telecom and Information Technology (MTIT) to map the existing digital governance situation in Palestine. In addition, invitations were sent out to 17 larger Palestinian municipalities to fill in a questionnaire designed to explore the digital development maturity of municipalities.
4. **Online interviews with key stakeholders** were conducted to get a deeper understanding of their current state of digital development as well as their plans and challenges faced. In total, 12 online

interviews were held with representatives of relevant ministries and authorities as well as with a representative of the academic sector (see Annex 1A).

5. **Development of the Digital Maturity Assessment Report**, based on the input from the desk research, questionnaires, and interviews**.** The report assesses the State's current status of digital maturity in the specified focus areas and provides suggestions for next steps. The report places the State at a certain level of maturity – BASIC, USEFUL, or SUSTAINABLE – in each category, and makes recommendations for next steps to be taken. The draft version was discussed with the main local partners, and their feedback was integrated into the report.
6. **Workshops presented the report** to national stakeholders and the international donor community.

2.1.3 Background of e-government development in the State of Palestine

The State of Palestine can be characterized by significant historical legacy together with cultural, ethnic, and religious diversity, and has been managing the reality of conflict for more than 50 years.

The State of Palestine was experiencing an economic downturn even before the COVID-19 pandemic hit. The United Nations Conference on Trade and Development (UNCTAD) lists "recurrent hostilities, geographical and economic fragmentation, technological regression, restrictions on imported inputs and technology, the loss of land and natural resources, settlement expansion, the leakage of fiscal resources and the near collapse of the economy of the Gaza Strip" as reasons for the unfavourable economic situation.[111]

The GDP per capita is projected to decrease by 3–4.5 per cent due to the pandemic,[112] and in September 2020 the Palestinian Central Bureau of Statistics reported an unemployment rate of 28.5 per cent for individuals aged 15 years and above.[113] Notably, the unemployment rate for ICT graduates was 29.5 per cent. According to World Bank data, more than a quarter of Palestinians lived below the poverty line prior to the pandemic, whereas the share of poor households is now expected to increase to 30 per cent in the West Bank and to 64 per cent in Gaza.[114]

Palestine relies heavily on donor support, which has declined substantially in recent years according to the UNCTAD report, falling from 32 per cent of GDP in 2008 to just 3.5 per cent of GDP in 2019.

The foreign occupation has significantly influenced the development of e-government development in the State of Palestine. For one thing, the possibilities of the State of Palestine to benefit from the use of modern technologies is hindered because of restrictions set on the movement of goods. The World Bank report emphasizes that the Palestinian territories are "among the last places in the Middle East to launch 3G in the West Bank and 2G in Gaza," putting them in a competitive disadvantage, as they face "restrictions on access to spectrum, sites for network coverage and import of certain telecom equipment." The World Bank report estimates that Israeli operators have a 20 per cent mobile broadband market share in the West Bank, as they can offer unlimited 4G and LTE services to those in proximity to Israeli networks.

[111] See https://unctad.org/system/files/official-document/tdb67_d5_en.pdf.
[112] Ibid.
[113] See http://www.pcbs.gov.ps/portals/_pcbs/PressRelease/Press_En_8-11-2020-lf-en.pdf.
[114] See http://documents1.worldbank.org/curated/en/844141590600764047/pdf/Economic-Monitoring-Report-to-the-Ad-Hoc-Liaison-Committee.pdf.

At the same time, ICT as a backbone of governance provides a source of stability and sustainability that can act as an accelerator to achieve the Sustainable Development Goals.

Looking back at the historical timeline of digital transformation, the first National Strategy for Telecommunications and Information Technology was announced in 2004 by President Abbas and was adopted in 2007, recognizing e-government as one of the main means to drive economic growth and social development in the territory. The Ministry of Telecommunications and Information Technology has been in charge of national e-government strategies.

Noteworthy nationwide e-government undertakings include the operation of the GovNet (since 2010), which connects all ministries to the Government Computer Centre; the development of the Palestinian Interoperability Framework (Zinnar [115]), which involved developing a joint meaning of data and maintaining metadata of government databases and services; and the development of the Palestinian secure data exchange solution (X-Road), based on the Estonian solution of the same name.

An e-Government Core Group, chaired by the MTIT, has been operating since 2010, involving representatives of more than a dozen government authorities, academia, and the private sector (since 2016).

The two main capacity-building efforts include setting up the Palestinian e-Governance Academy in 2010 by the Birzeit University and MTIT to support interoperability, security, and legal informatics in the framework of a two-year EU-funded project, as well as establishing an ICT Training Centre within MTIT in 2014, which is still operational.

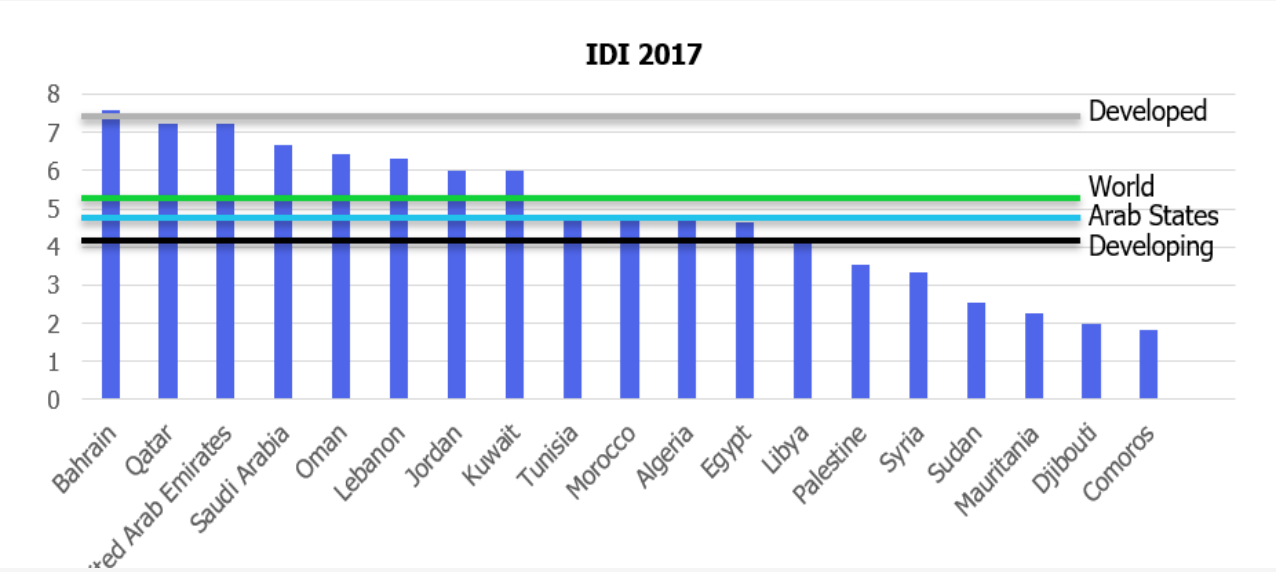
The Palestinian Authority's National Policy Agenda: Putting Citizens First (2017–2022) emphasises the importance of digital transformation by having a digital economy as one of the priorities to achieve an inclusive and sustainable economy, as well as by promoting digitalization in education.

In the most recent Global ICT Development Index (IDI) issued by the International Telecommunications Union (ITU), the State of Palestine is ranked 123 out of 176 countries. Palestine's performance is below the world average as well as below the average score of the Arab States (see ***Figure 7***). The report specifically notes that the "Palestinian telecommunications sector is characterised by the presence of a private regulated monopoly and increasing competition" and that "efficiency in the telecommunication sector will have far-reaching effects throughout on the Palestinian economy."[116]

[115] See http://zinnar.pna.ps/InteroperabilityPortal.

[116] See https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume2.pdf.

Figure 7. Arab States in ICT Development Index 2017



The year 2020 has added further challenges to the already complicated political and economic situation, with the COVID-19 pandemic having a major influence on the economy and society of the State of Palestine. At the same time, the pandemic raised the demand for remote work and study as well as digital solutions for the economy and government interactions with citizens and businesses.

COVID-19 has also led the Ministry of Telecommunications and Information Technology to update the ICT Strategy 2017–2022, and the updated version for 2020–2022 was in the process of being approved at the time of this writing.

Indeed, there are great efficiencies to be gained from digital transformation, such as seen in the June 2020 World Bank Economic Monitoring Report to the Ad Hoc Liaison Committee,[117] which placed high expectations on the digital economy to boost economic development in the State of Palestine, provided investments are made in national digital infrastructure. The next chapter will provide an overview of the current state of e-government as well as suggest next steps to be taken on Palestine's digital transformation journey.

2.1.4 Digital maturity of the central government

This chapter provides an overview of the current e-government situation in the State of Palestine, looking at 12 e-government domains. For each topic, the report places the State of Palestine at a certain level of maturity: BASIC, USEFUL, or SUSTAINABLE.

- **Basic maturity**: Organizations implement e-government activities based on the level of their internal capacities. There is no clear strategy or coordination in place. The activities are mostly sporadic, and processes are reactive in nature.

[117] See http://documents1.worldbank.org/curated/en/844141590600764047/pdf/Economic-Monitoring-Report-to-the-Ad-Hoc-Liaison-Committee.pdf.

- **Useful maturity**: A strategic framework for e-government is in place and a division of roles exists. Conditions are created to be able to benefit from standardization, coordination, and the shared use of digital components and resources, but there are certain shortcomings when it comes to implementation.
- **Sustainable maturity**: E-government is a natural part of the operation of the public sector and the society as a whole. The public sector and the private sector jointly use digital components to reach the strategic objectives of the country. Processes are controlled and measured, with effective stakeholder involvement and a good balance between the top-down and bottom-up approaches.

In addition to indicating the maturity level, the report provides recommendations for further actions in each topic.

2.2 Political will and support

High-level political leadership paves way to the adoption and implementation of relevant policies and agendas. The introduction of e-governance should be a political priority and an agreement among all political forces. Political will must be declared at the highest possible level, for example, by the president or the parliament. For this to have proper effect, it is important to identify roles and determine responsibilities for coordination and implementation, also encouraging public-private partnership and cooperation with academic institutions. The agreement shall state the use of digital technologies to be successive as well as a main method of developing the society and addressing its challenges. Political will, if possible, should be affirmed with a political document, such as "Fundamentals of Information Policy," which would be a guarantee of such will.

Government and its leaders must be able to change the mind-set of officials at all levels, to reengineer existing public services and related operations, and to guarantee the enforcement of the strategies and legislation by setting up relevant authorities. Political leaders need to stay engaged and commit time, budget, and even political capital to the cause of e-governance. In addition, ongoing open government and e-governance capacity-building is necessary.

Current situation in the State of Palestine

According to the survey response by the Ministry of Telecommunications and Information Technology and the e-Government Core Group where all key e-government stakeholders are represented, there is strong support from the political level towards the implementation of e-government, and there is a general consensus between all political forces of the importance of digital transformation. The main spokesperson for e-governance in the State of Palestine is His Excellency the Minister of Telecommunications and Information Technology, Dr. Ishaq Sider.

The main high-level document on e-government is the ICT Strategic Plan, which had been adopted for 2017–2022 after consultations with a wide range of stakeholders from the public, private, and academic sectors, and was updated in the context of the COVID-19 pandemic. The updated version of the strategy for 2020–2022 has been drafted and was in the process of being approved at the time of this writing.

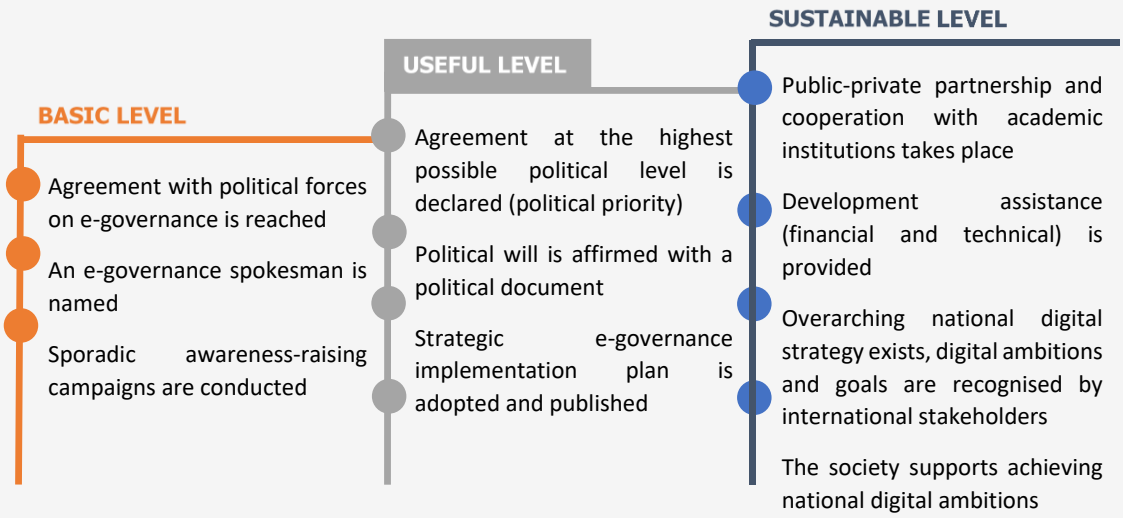
The updated ICT Strategic Plan envisions five strategic objectives to be reached within three years (by 2022). The first strategic objective is a secure, comprehensive, and advanced infrastructure, which includes among many other things a functioning national data centre (including use of a private cloud and

an external disaster recovery centre) and an electronic authentication unit. The second strategic objective is a modern and comprehensive legislative and regulatory environment. The third strategic objective is advanced and effective electronic services, which envisages 30 online services by different government authorities and an e-payment system. The fourth strategic objective focuses on a competitive digital industry; and the fifth one on qualified and productive human resources.

In the digital maturity assessment questionnaire, MTIT and the e-Government Core Group indicated all fields of e-governance as having high priority of development, highlighting in particular the upgrade of X-Road to the latest version to achieve a higher level information security, implementing e-services for citizens and businesses, and implementing a national e-payment system.

Throughout all interviews, political support was recognized and considered very important, but this has not been converted into a regularly monitored and adjusted policy framework. Politicians are seen as enthusiastic about the benefits of digital transformation and they are not hindering e-government development, but they are also not the driving force behind the progress.

Figure 8. Political will and support – Maturity level: USEFUL



Recommendations

Investments with clear socio-economic impact. Political priorities need to be translated into tangible digital services with measurable social and economic impact. The rollout of these services should be monitored and reported also at the political leadership level. Metrics, such as timeline and key performance indicators, must be an inseparable part of the strategy and periodically (e.g., semi-annually) monitored through reports to the government level.

Digital transformation and international cooperation. Policy development within the international cooperation framework needs to be enhanced. Regular peer meetings with colleagues at the ministerial level should include topics on digital transformation, relevant to Palestinian priorities. Active participation in multinational policy development (including the UN and ITU) is highly recommended. These interventions should reflect the present situation and digital ambitions of the State of Palestine.

2.3 Coordination

The coordination component includes designating an institution that will have the mandate to take decisions on e-governance for the entire administration. It is possible to have regional (federal state) solutions, but in any event, coordination will be needed. This does not mean centralizing, but rather ensuring that relevant decisions are properly coordinated. The coordinating institution is responsible for the strategic planning necessary for a state building e-governance and, more generally, an information society. The higher in the hierarchy the appointed unit is, the better the chances of directing ministries and agencies. The power and competences of the coordinating institution should be determined by legislation.

Current situation in the State of Palestine

The overall responsibility for the coordination of e-government topics in the state lies with the Ministry of Telecommunications and Information Technology, who is responsible for the telecommunications sector, the information technology sector, and the postal sector.[118] In the IT sector this also includes responsibility for sectoral standards and strategies as well as responsibility for the government computer centre, which manages the government network and a data centre, and hosts the government email system and human resources system. The Ministry also includes a centre for ICT training.

MTIT has the main responsibility for e-government legislation and has coordinated the implementation of the framework for the secure exchange of data in the public sector. The e-government department at MTIT includes a support unit that provides support for X-Road systems (connectivity, e-services, security server, central systems), a partnerships unit working with other ministries, the business sector and donors, an integrated applications unit developing services such as mobile apps and the e-services portal, a standardization unit mainly working on the Zinnar interoperability framework, and a strategies and policies unit that develops and follows up on e-government strategies and policies. MTIT's role as coordinator was also recognized in the interviews by other ministries.

Each ministry has their own IT unit, which is in charge of their system and services, whereas MTIT provides consultancy and support in information security issues as well as sets the general strategic and regulatory framework. The IT units of ministries are headed by a director-general. Together with representatives of the private sector (Palestinian Information Technology Association of Companies or PITA) they form the permanent e-Government Core Group, which meets on a monthly basis. However, one ministry interviewed still called for better administrative cooperation among ministries.

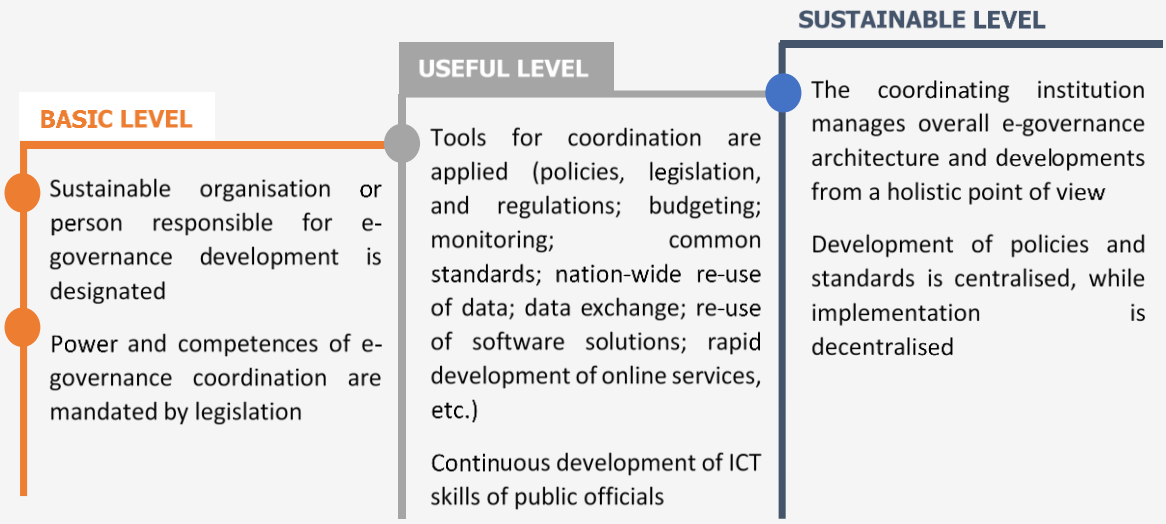
Although each ministry is responsible for planning and implementing its own ICT projects, for certain projects of national importance there are steering committees in which MTIT is also included. Through such committees MTIT is involved in establishing guidelines for the new project and ensuring compliance with general regulations and principles. One example of such a committee is the committee on a national e-health strategy, which is tasked with the creation of a single national health database connecting both public and private hospitals as well as clinics.

Based on the interview with the Palestine Polytechnic University, the government has involved the academic sector in e-government discussions in the past, with some joint projects conducted for advancing scientific research into e-government, boosting employment and the development of industry,

[118] See https://mtit.pna.ps.

but there has been no significant cooperation over the last 3–4 years. However, according to MTIT the Palestine Polytechnic University is a part of the e-Government Core Group, and the reason behind the limited involvement of the academic sector over the last years is embedded in limited financial resources.

Figure 9. Coordination – Maturity level: USEFUL



Recommendations

High-level coordination body. A high-level coordination body should be mandated and enforced to set the national digital agenda (across sectors) as well as to harmonize and prioritize different digital transformation programmes. This body should be led by the prime minister and include representatives from selected key public-sector authorities, the private sector, critical infrastructure operators, and academia. The E-Estonia Council[119] could serve as an example with its composition and tasks to:

- direct the implementation of the national digital agenda that provides a vision for the digital transformation of all sectors of society in Palestine, including initiating and giving opinions on agenda review proposals, approving the action plan for the agenda and its implementation reports, giving opinions on proposals to evaluate agenda implementation and the evaluation of results, and guiding collaboration between government institutions and sectors;
- form and give opinions in matters related to digital society development in the country, elsewhere in the region and the world, including input regarding national positions in international organizations;
- make proposals for preparing policy documents to steer the development of digital society, and review and give opinion on relevant draft proposals;
- act as a sectoral monitoring committee for international donor involvement and funding in the ICT policy field.
-

Interoperability standardization and assurance body. Establish or mandate and enforce an interoperability standardization and assurance body that signs off on all new digital development projects of all ministries

[119] See https://www.riigikantselei.ee/en/supporting-government/e-estonia-council.

and public agencies that create new services and/or new databases, and that have a budget exceeding a certain level (e.g., $1 million).

2.4 Financing model

General financing and financial models for e-services need to be developed in order to ensure sustainability. For every e-governance solution the total cost of ownership of the solution must be planned. The introduction of e-governance will have a cost, even if it will soon lead to savings in other respects, so it is essential that there is adequate provision for the necessary funds in a sustainable manner. The provision can be made centrally, but also at the level of specific institutions. In any case, sufficient financing should be provided on a medium- to long-term basis, preferably through multi-annual budgeting. Authorities must be able to manage the risks arising from cyclical planning of the state budget. For example, in the state financial forecast a separate budget line is allocated for the development of e-governance. To support that allocation, clear procedures for planning the e-governance budget and managing the use of budgetary resources must be established. The transparency and accountability of the financial model need to be ensured.

Current situation in the State of Palestine

Each ministry and authority is in charge of planning and executing its own annual ICT budget.

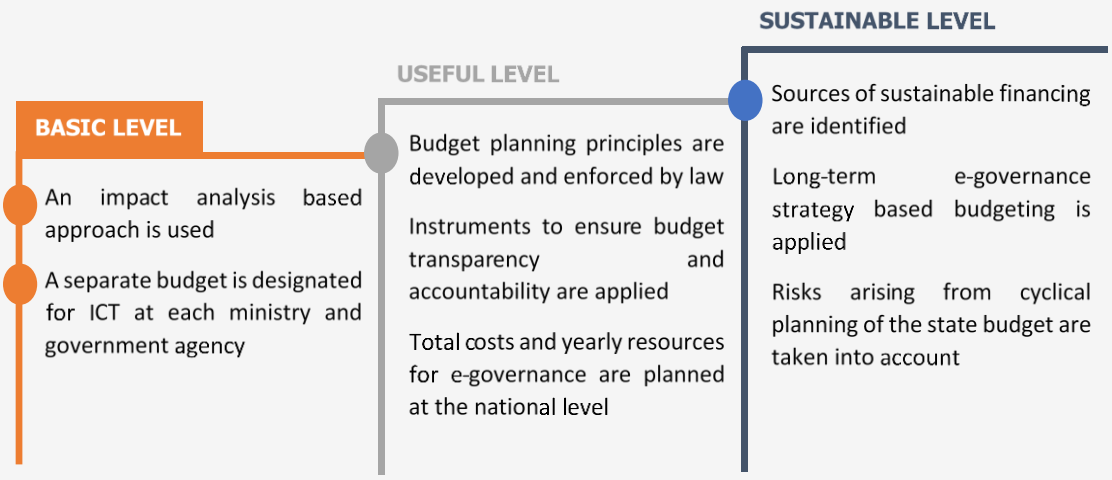
As a part of the budgetary process, ministries make their budget proposals to the Ministry of Finance, and these are then defended by the submitting ministry and evaluated. According to MTIT, ICT budgeting is based on a prioritized list of projects based on actual needs. Budget planning principles are set and enforced by the Ministry of Finance and the annual budget law.

During the budget implementation phase there are controls applied to the use of the budget and reporting: for instance, a computerized accounting and financial system used by all ministries and government agencies that shows transactions and financial counts, and that is used by authorized users only with specific privileges according to their professional roles.

The main challenge faced is the instability of financial resources stemming from the political situation. Over the last years and especially in the context of the COVID-19 pandemic, the main issue has been the lack of funding. Whereas many interviewees claimed that many ministries barely have funding to maintain their existing systems, there were a number of ministries whose representatives stated that development costs constitute around half of their ICT budget.

Development of e-government is partially dependent on international donor funding. The main donor organizations supporting digital transformation in the State of Palestine include the World Bank, the Organisation for Economic Co-operation and Development, UNDP, and the European Union. The Department for International Cooperation at the Ministry of Finance is involved with donor coordination. There is no procedure for MTIT to review or approve proposals submitted to donors.

Figure 10. Financing Model – Maturity level: BASIC



Recommendations

Digital operating budget. The annual operating budget for digital expenditure needs to be articulated clearly at the level of ministries and agencies. This should be expressed in a separate budget line: digital operating expenditure. For larger projects, centrally coordinated guidelines developed by MTIT should be available.

Financing templates for digital solutions. The development of new digital solutions and the infrastructure of all ministries and agencies need to be addressed in similar financing templates that indicate the Key Performance Indicators of the investment as well as the expected impact. To ensure interoperability and technological harmonization and to avoid duplication, digital development budgets need to be signed off by the institution overseeing the interoperability standard, approved at the national level in Palestine. Financing plans should be tied to the ICT sector strategy or the national policy agenda to ensure sustainability.

2.5 Legal framework

There are no legal prerequisites for starting the process of introduction of e-governance. There are, however, several laws that need to be looked at, and this legal overview should be made in the early stages of e-governance development. The more innovative the e-governance solution, the more it changes existing workflows. Major changes in workflows may require new or amended legislation. The changes needed in the legal framework are country-specific, but often relate to electronic signature, data protection, accepting electronic information, etc.

The key legal issues to keep in mind in the context of introduction or further developing e-government can be summarized to include (but are not limited to) the following:

- There should be no obstacles to using electronic format for administrative acts;
- Electronic acts should have the same legal force as traditional acts;
- There should be a possibility for secure electronic identification and signature;
- Data protection provisions should be in place and implemented;

- There should be rules on the establishment of databases and interoperability of data;
- Issues of responsibility for adoption of necessary rules and regulations should be clear.

In addition to laws, different strategies and plans need to be developed and drafted, clearly indicating the connection between the legal component and the governance one.

Current situation in the State of Palestine

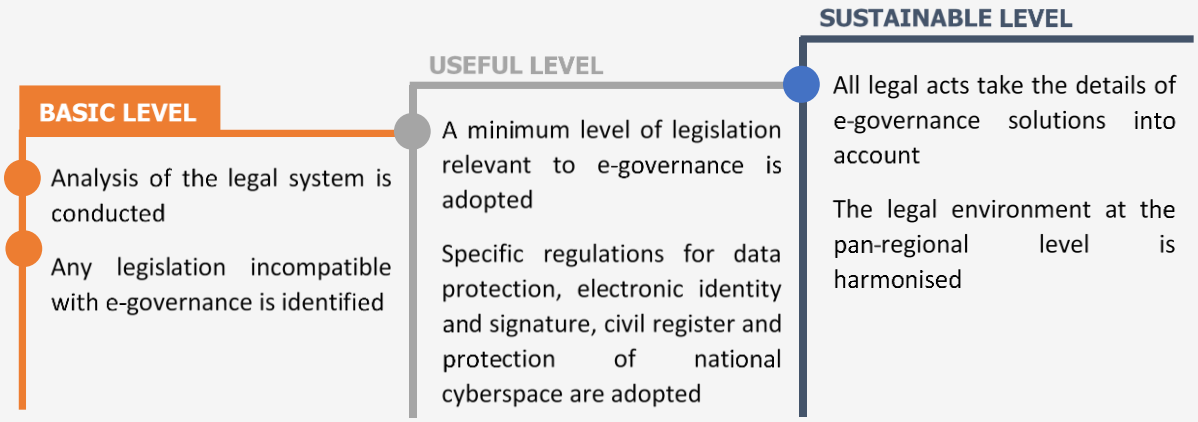
The proper legislative process does not function in Palestine as the Legislative Council has been inactive since 2007, but under the Basic Law it is possible to adopt legislation by Presidential Decree. The MTIT is generally responsible for the legal framework related to e-governance, in cooperation with other partners and stakeholders. Palestine has not conducted a thorough overview of legislation to identify any possible obstacles to e-governance. In addition, many relevant laws are not properly updated or not fully in line with the protection of rights as set out in the Basic Law and in international instruments. Palestine adopted a Cyber Crime Act in 2018. This law is controversial, as it has been claimed by civil society and independent observers that it allows for excessive restrictions of freedom of expression. In some areas, legislation and strategic documents are available but need to be updated to fully correspond to the needs of digital development. The telecommunications law in force is from 1996, as legal amendments initiated in the early 2000s (and most recently reflected in a draft from 2018) have still not led to the adoption of a new law, which would include the creation of an independent regulatory agency. It is hoped that a new law – suitable for the modern ICT sector – will be adopted in 2020. There is an electronic transactions law (from 2017), which is in the process of being updated and which should provide the legal framework for a certification authority. It was mentioned by one interviewee that e-services could not properly be offered within the current legislative framework because the law states that a person needs to retrieve certain documents after authenticating themselves in person.

Many legal acts are currently being drafted or are soon to be adopted, for example, the amended telecommunications (ICT) law, amendments to the electronic transaction law, legislation on personal data protection, law on digital identity, National Payments Law, Information Security Policy, etc. The State of Palestine does not have a separate law or regulation on databases, on access to information, or on e-participation.

There is no specialized independent authority responsible for personal data protection. There is no data protection law, although privacy is protected by the Basic Law. Until now, each institution has been responsible for maintaining the confidentiality and privacy of the personal data it holds. Access to (electronic) data has at times been handled as a technology issue with insufficient regard to the need for a legal basis before any access can be given. One interviewee specifically highlighted the issue that breaches concerning personal data cannot be prosecuted. It should also be mentioned that the interviewees specified practices of sharing personal data between authorities without a proper legal basis and without due consideration of whether the sharing is necessary and proportional. Specifically, personal data has been shared for statistical purposes without being duly anonymized.

All in all, legal constraints were among the top challenges/constraints to digital transformation mentioned by the interviewees.

Figure 11. Legal Framework – Maturity level: BASIC



Recommendations

Adopting pending legal amendments. Work on adopting pending legal amendments should be pursued more actively and without further delays, including updating telecommunications legislation to create an independent regulatory agency and updating digital transactions legislation to include digital identities and a certification authority. Access to information legislation and data protection legislation should also be adopted. Pending the adoption of the latter, guidelines for data protection can be issued to set out principles of proportional and necessary data sharing between authorities, such as including instructions on when data should be anonymized prior to sharing.

Setting up relevant competent authorities to enforce the adopted laws. Protection of personal data as well as the perception that such data is protected is essential. An independent data protection authority needs to be set up to guarantee this through proactive working practices. Likewise, an independent telecommunications regulatory authority is needed to advance this crucially important sector.

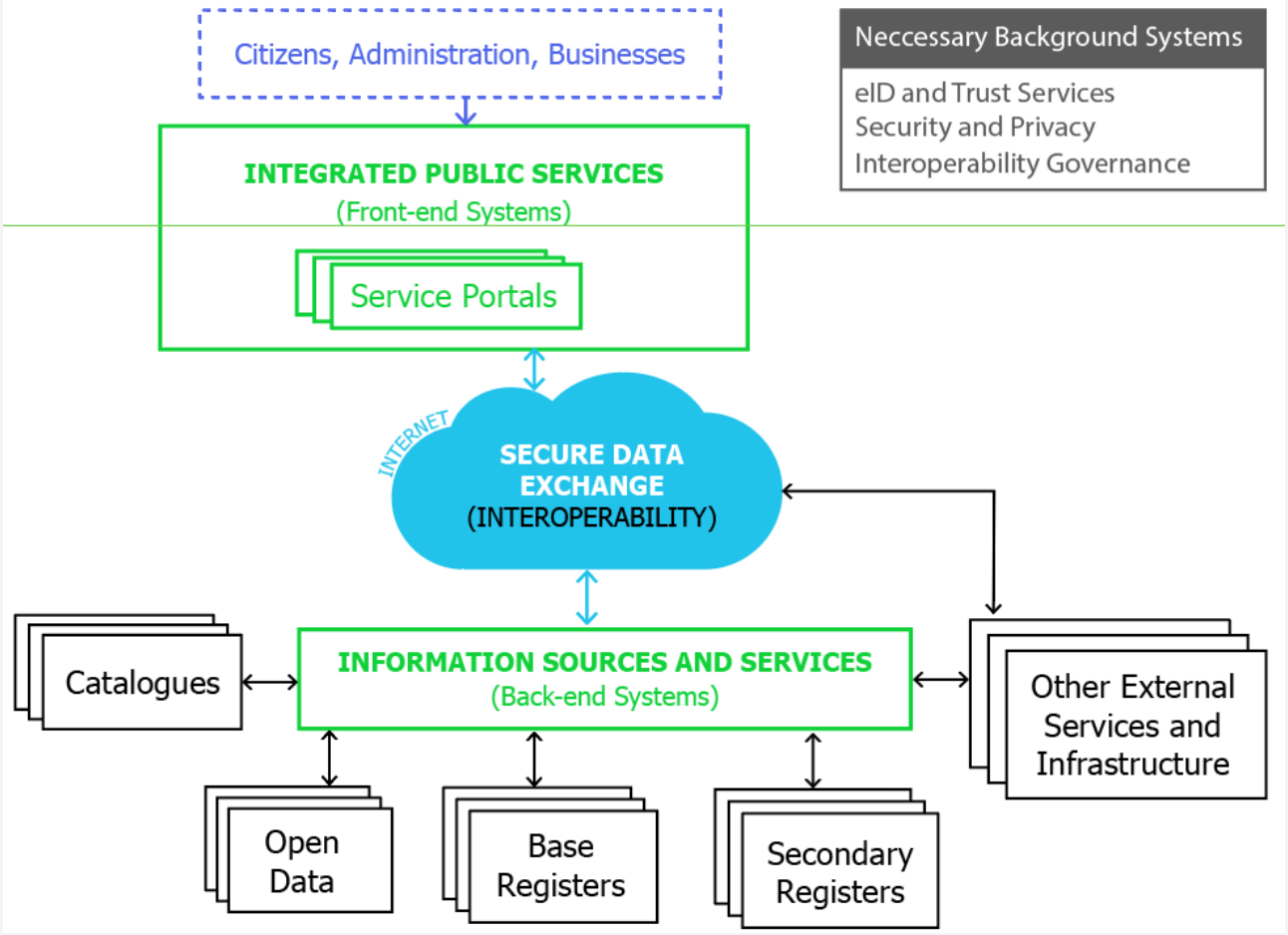
Identifying legal obstacles to e-governance. A proper legal analysis should be conducted to identify any obstacles to e-governance in order to be able to determine what further legal changes are necessary to remove such obstacles (whether in the form of amendments to various laws or the inclusion in one law with general provisions stipulating that digital signatures/documents generally, across all legislation, should be seen to have the same value as traditional ones). This analysis should be carried out by local legal experts who need to have expertise in primarily public law (but need not be e-governance experts), who should identify exactly which legal acts need to be reviewed. Such a review should be undertaken together with e-governance experts, who can explain the technology to design the appropriate legal solutions. It may be necessary and sufficient to change definitions in legislation so as to ensure that existing laws can include electronic transactions and documents.

2.6 Digital databases, interoperability, secure data exchange

The digitization of public services means that ministries and government agencies capture and process data in a machine-readable form. It is important for a citizen-centred and service-oriented state to make sure that different organizations and information systems are able to work together and exchange information. Authorities need to take advantage of the data that the state has already collected from citizens and businesses and not burden them with asking for the same information several times or have citizens request information from one public authority simply to hand it over to another public authority. Hence, digital databases and data exchange are needed.

A modern e-governance model is a component-based service model, allowing the establishment of public services by reusing, as much as possible, existing service components. Public administrations should agree on a common scheme to interconnect loosely coupled components and put in place the necessary infrastructure. A general conceptual model for integrated public services (based on the European Interoperability Framework) is illustrated in Figure 12.

Figure 12. Conceptual model of integrated e-government (based on the European Interoperability Framework)



The model is modular and comprises loosely coupled service components interconnected through shared infrastructure.

The model promotes reusability as a driver for interoperability, recognizing that public services should reuse information and services that already exist and may be available from various sources inside or beyond the organizational boundaries of public administrations. Information and services should be retrievable and be made available in interoperable formats.

Current situation in the State of Palestine

All ministries interviewed are in charge of several databases. The main databases (civil register, business register, tax registers, custom register, social security register, etc.) are available in digital form, and according to MTIT assessment the data therein are of good or at least acceptable quality. Oracle, SQL, and MySQL were the most commonly named databases in use. However, there are also databases that are not yet connected to the X-Road (e.g., NGO database of the Ministry of the Interior) and some that are not yet even digitized.

Ministries use information systems to facilitate their day-to-day operations: human resources management, financial management, document management, archiving, etc. The human resources management system is administered by the General Personnel Council and the financial system by the Ministry of Finance. Most of these systems are not used as a shared service. Branch offices of institutions seem to be well connected to the main office and its information systems.

The Zinnar Interoperability Framework was established in 2014 to facilitate the exchange of data between public sector systems and services. Zinnar consists of five servers: Ontology Server, Entity Server, Address Server, Service Repository, and Database of Databases. The interoperability framework also prescribed that all government entities have to adopt a set of agreed standards to exchange data messages.

During the interviews the Ministry of National Economy was the only one to bring up Zinnar and the fact that they meet its standards. MTIT admitted that Zinnar has not been a priority topic, but that there is a need to have an overview of all registers, databases, services, and information assets. MTIT sees the need to set it more in focus and restart the related discussions, and thus in 2019 the Zinnar team was reformed and is currently working on issuing new standards.

Palestine also implemented a secure data exchange solution in 2014, which allows ministries and authorities to exchange data among themselves and provide services. The solution is called X-Road and it is an implementation of the Estonian secure data exchange solution of the same name. In 2014 the central system was set up and 13 ministries and authorities were included in the first phase. Some 12 services were set up with the help of Estonian experts. Training was provided for MTIT staff as well as officials of participating ministries.

Joining the X-Road is a formal process that involves signing a legal agreement regarding the data that will be exchanged. At present, 43 public authorities are connected to X-Road. According to MTIT and other ministries interviewed, the X-Road is operational and frequently used. For instance, during the first 10 months of 2020 the citizen registry inquiry service for citizen information based on ID number received more than 2 million requests. The Ministry of Finance stated that they have X-Road connections to all necessary public sector authorities; and the Ministry of Transport said all their main connections are over X-Road and that some new connections will be added in the near future (for example, with the Customs Department of the Ministry of Finance to achieve further transparency and data integrity).

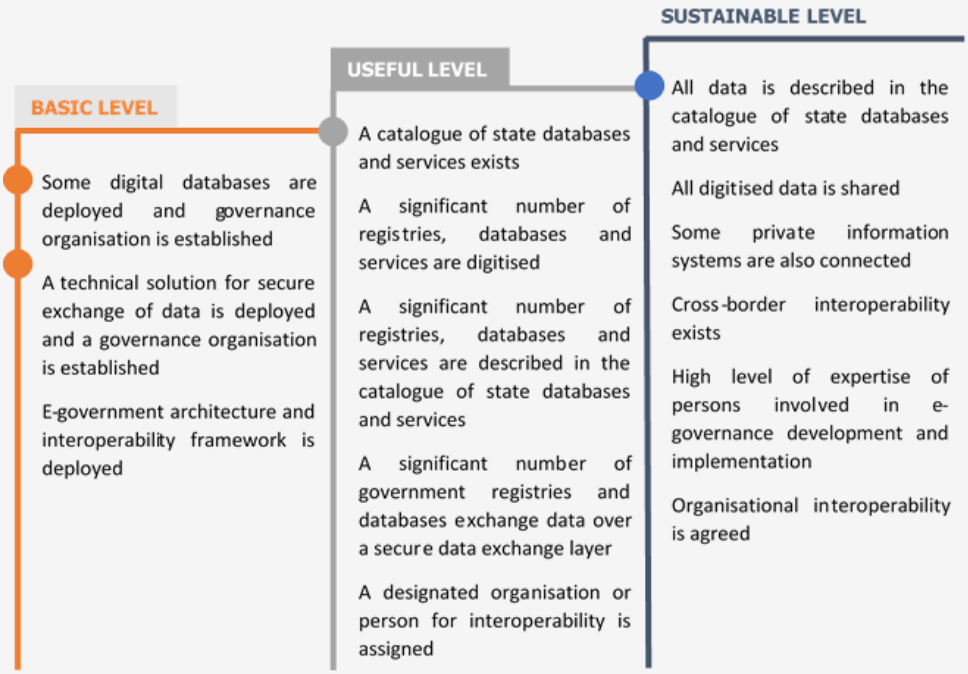
Nonetheless, there are still ministries that wish to be better connected. For instance, the Ministry of National Economy provides four services to a dozen ministries but claims not yet to have access to the civil registry hosted by the Ministry of the Interior. In addition, there are other institutions that do not seem to be very well connected. For example, the Ministry of Justice is connected to the Ministry of Interior but listed 13 other organizations with which they have other types of connections (e.g., a virtual private network with various branches of the military). The Ministry of Interior has opened up the civil register via X-Road based on bilateral agreements with 22 government organizations, but has yet to connect the NGO database, citing security issues as the reason.

For all the current limitations, however, whenever ministries talk about adding new connections, these are planned over the X-Road. Technical knowledge of the X-Road remains largely with MTIT, which provides support to other ministries. One respondent seemed to be unaware of the fact that databases from different vendors could be connected to X-Road to securely exchange data.

It should be noted that the X-Road in use in Palestine since 2014 is version 5 of the solution, which is no longer the latest version available. There are plans to upgrade X-Road to the newest version, which is expected to provide more security guarantees. Funding is currently sought to this end. Two respondents also mentioned that they felt citizens were worried about the security of data exchange (including for online payments) because of the tense political situation and incomplete legislative framework.

All in all, Palestinian ministries are welcoming the chance to exchange data securely over X-Road and taking part in nationwide projects, but automation of e-services remains a problem as there are not many services that would use X-Road. There is a shortage of staff automating processes and reengineering services, both at the ministries and at MTIT. Many services are not yet operational as they require an e-payment solution.

Figure 13. Digital Database – Maturity level: USEFUL



Recommendations

X-Road upgrade. Upgrade to a new version of X-Road with renewed training to representatives of ministries to guarantee effective operation and information security.

Reinforced implementation of Zinnar. A reinforcement of the Zinnar interoperability framework is recommended to have a clear and updated overview of the state's information system as a whole. To guide future developments information is needed on the existing information systems, which data are collected and processed in which information systems, who are the contact persons of different information systems, on which legal bases the information systems are operated and the data is processed, and which are the reusable components ensuring interoperability.

2.7 Secure digital identity, digital signatures

For e-governance services to be useful for all types of governance tasks, it is essential that the persons using them can identify themselves in a secure manner. This requires the development of a digital identity concept and tools. This can include digital ID or mobile ID together with a digital signature. Signatures must be secure enough to be recognized as evidence in court or similar situations.

Current situation in the State of Palestine

Public hospitals are connected to the Ministry of the Interior via X-Road, and each new born is assigned a unique persistent identity number at the hospital. The identity number is used for all citizens in West Bank and Gaza and is included on the Palestinian ID card.

The Ministry of Interior has been planning to add biometric information to passports and ID cards, but the related equipment has not been released by Israel since March 2018.

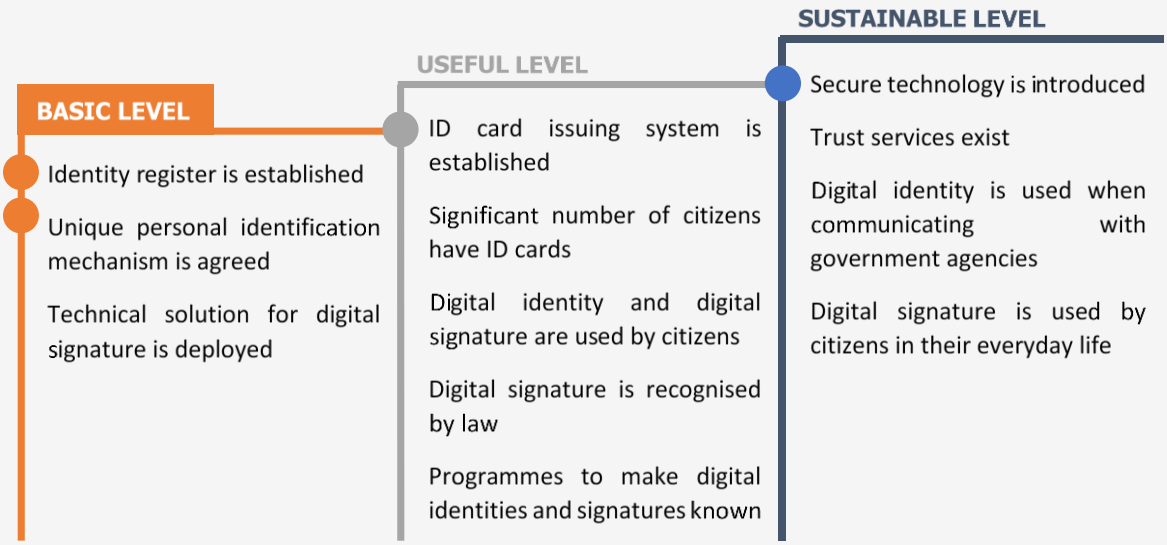
For digital identity, almost all government information systems include usernames and passwords. There have been plans to introduce smart ID cards and trust services, and the long-term plan is still to establish a Certification Authority and implement a solution based on Public Key Infrastructure (PKI), which would also allow for digital signatures. However, this solution takes time and MTIT efforts are currently directed at implementing a single sign-on (SSO) as a temporary solution that can be used to access all e-services.

It should be mentioned that the Palestine Monetary Authority (PMA) started working on a PKI solution already in 2010. One of its main objectives was to provide banks with the possibility of centralized authentication, encryption, and signing. Initially the objective was to issue smart cards to clients, but recent trends favour mobile solutions for storing certificates. Although the PKI project is still under PMA control, its implementation requires close cooperation with other authorities, and PMA does not see itself as in charge of the decision on how to proceed with the project. Also, they do not see themselves as the primary responsible authority for PKI in the future, mainly because they do not have the staff to manage this complex service. However, they would be able to support MTIT on technical and procedural matters related to establishing PKI in Palestine. The MTIT stated in the questionnaire that digital identification infrastructure is planned to be implemented in partnership between the public and private sectors, where the government is responsible for licensing and auditing and the private sector is in charge of developing certification services.

According to MTIT, it is foreseen that the digital identity and trust services would comply with the requirements set by the European Union's Electronic Identification and Trust Services Regulation (eIDAS), which would allow for mutual recognition of digital identities and trust services with all EU member states.

According to the interviewees, the main success factors for PKI include creating market need by promoting digital banking and electronic payment of utility bills. People currently prefer to pay in cash, as online payment is not widely available. A couple of interviewees also pointed out the importance of legislative acts that are either partly outdated or are not sufficiently enforced (for example, courts and the police do not accommodate electronic transactions).

Figure 14. Security Digital Identity – Maturity level: BASIC



Recommendations

Careful implementation of the e-payment/SSO project. Having the strategic importance and extensive scope of this project in mind, it is essential to involve international best practice and expertise as well as continuous monitoring and reporting to ensure its successful implementation. After the technical implementation, significant efforts need to be turned to user acceptance and actual usage through media and communication campaigns.

Strategy for digital identity management. The implementation of digital identity and Public Key Infrastructure is a very important long-term goal. Considering the significant time required for its planning and implementation, it would be useful to conduct a comprehensive analysis on the legal, organizational, and management aspects (including establishing a Certification Authority) of digital identity management. It would also be useful to develop a strategy and action plan for identity management development together with a selection of the token(s) of digital identity to be used and the human resources, skills, and communication efforts needed for this project.

2.8 Digital skills

The rapid development of digital technologies requires both public officials and citizens to acquire skills

needed to use the new tools and enjoy the possibilities of a digital society. In addition to equipping all citizens and public officials with basic skills, authorities need ICT specialists with advanced IT and project management skills to maintain ICT architecture and user support, manage ICT procurements, and implement the government's digital strategy.

Current situation in the State of Palestine

Most public officials in Palestine have computerized workplaces. All organizations interviewed had an IT unit. Out of all staff, the average age of ICT personnel was in most cases between 1 per cent (Ministry of Finance, Ministry of Health) and 8 per cent (General Personnel Council), with the exceptions of the Palestine Central Bureau of Statistics (15 per cent) and MTIT (20 per cent). Based on the questionnaire response by MTIT, most of the ICT positions are currently filled and ministries do not encounter difficulties with filling ICT vacancies. However, the retention rate of IT staff is said to be slightly below the overall retention rate.

Based on the interviews, ministries are generally satisfied with the level of digital skills of their staff. They mainly see a regular need for upgrading skills as part of life-long learning, and to be able to make full use of existing technology and systems. This was further confirmed by the MTIT survey response where they evaluated the digital skills of their staff and rated all 11 skills as average or higher for non-ICT staff and good or excellent for all ICT staff. According to MTIT, training needs assessments are conducted for the most needed skills for better performance of job assignments, and thereafter a prioritized list is developed to be implemented when financial resources are available.

Although some shortages in specialized digital skills were pointed out, such as advanced information security issues and specific skills related to the e-payment project, the shortage of staff was seen as a more pressing issue. For instance, according to MTIT some 32 additional people are to be locally recruited in the near future for the e-payment system and other related projects.

Universities offer ICT education at the tertiary level, but this mostly includes computer systems engineering programmes, while no curricula are specifically dedicated to e-government, cyber security, or other specialized areas related to e-government.

MTIT provides trainings and seminars in their training centre for civil servants and fresh graduates and sees financial possibilities as the main challenge. Lack of financial incentives is also seen as one of the main reasons why the public sector is not a particularly attractive employer in general.

Local private-sector companies and their staff are seen as highly skilled and good partners that the public sector is glad to involve as experts, especially for the development of specialized systems. Some ministries in need of specialized systems also purchase solutions from abroad (e.g., customs programmes). Because of a lack of resources, however, private-sector companies can sometimes only be involved where donor funding is available.

MTIT and the e-Government Core Group view the digital skills of the general population generally as adequate. According to the Household Survey on Information and Communications Technology conducted by the Palestinian Central Bureau of Statistics in 2019,[120] about 73 per cent of individuals 10 years and above who use computers have basic skills, such as copying files and folders and sending emails

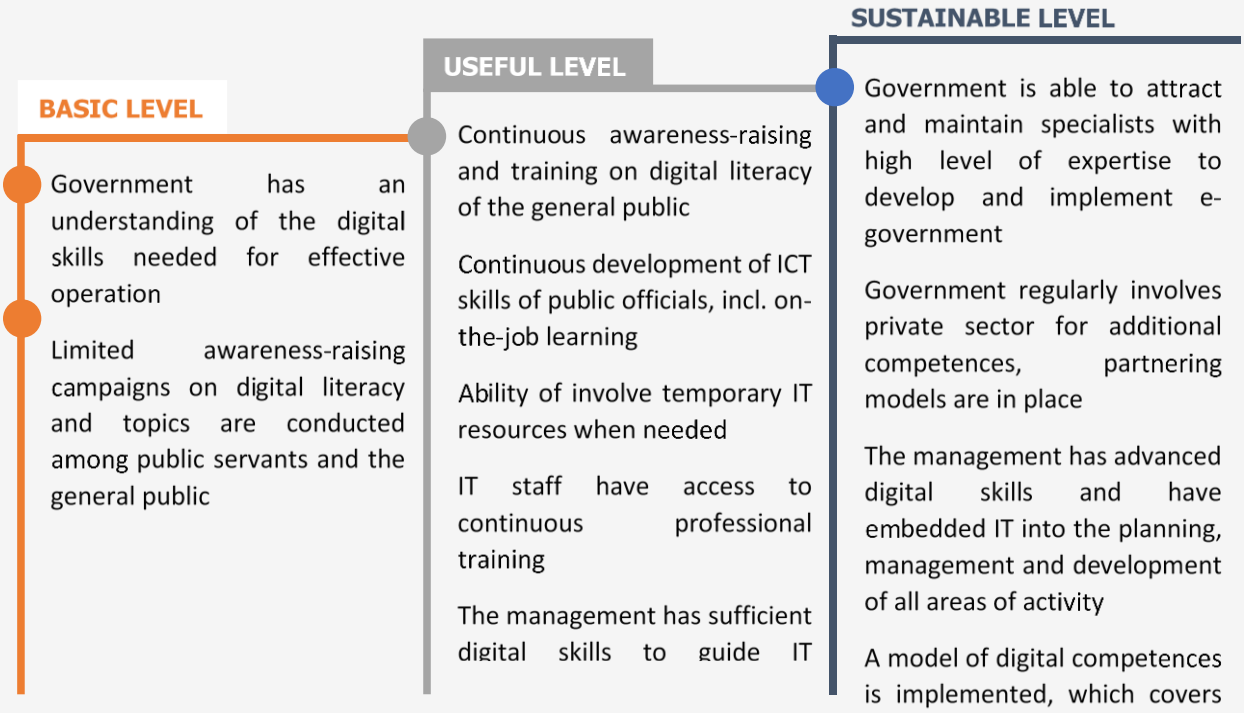
[120] See http://www.pcbs.gov.ps/portals/_pcbs/PressRelease/Press_En_17-5-2020-com-en.pdf.

with attachments; 46 per cent have standard skills, such as installing or configuring software and using computational formulas on spreadsheets; and 11 per cent have advanced skills.

Awareness-raising campaigns have been organized to this end, led by the private sector and local governments. MTIT believes that such campaigns and trainings should be expanded and have already foreseen awareness-raising activities as part of the e-payment/SSO project.

In 2016, Palestine Polytechnic University led a study on readiness for e-government and found out that digital skills of Palestinians are not a significant issue (people can use technology and have access to the Internet), but the main challenge lies in trusting electronic systems, especially for services where payments are required.

Figure 15. Digital Skills – Maturity level: USEFUL



Recommendations

Digital skills training for various target groups. The level of digital skills in society and technologically competent human capital is one of the key success factors in delivering digital transformation in practice. Training courses need to be based on skills assessments and carried out with the possibility to obtain a certificate of completion. Since digital services and infrastructure are critical for society, cyber hygiene and individual cyber competences need to be set as standard for not only civil servants but for the whole society. Curriculum development at universities needs not only to engage private sector needs and demands but it is highly recommended to involve practitioners in lectures, seminars, and practice programmes at universities. It is also important to raise the citizens' level of trust towards e-services, but this can mainly be done through actual user experience, making sure that services are reliable and easy to use.

Improving capacities for ICT in education. To support the mainstreaming of digital skills in curricula at all levels of education, it is important to ensure that teachers possess the necessary modern digital skills and know how to use them in their area of teaching as well as to invest in modern infrastructure.

2.9 Access to services

To be able to benefit from the advantages that a digital society brings, citizens and businesses should be able to access public services online. These should not simply be available, but also easy to access on different devices and platforms, inclusive and user-friendly. To communicate with the public, the administration should establish a device and technology neutral digital information channel, such as a government portal, operating on various devices. This information channel is used to provide both information services and procedural services. A well-functioning digital information channel will transform government services into a single whole and improve the availability of public services.

Current situation in the State of Palestine

Palestinian ministries offer a limited amount of e-services. Ministries have websites where information about the ministry, its functions, contacts, and the public services it offers are published online. As a rule, however, such websites are informative and not interactive. Further, not all ministry websites appear to be regularly updated. The AMAN-Transparency Palestine 12th annual report[121] points out that according to their survey conducted in 2019, "a sample of 34 public institutions showed that five of these institutions do not have websites, and there have not updated their websites for the past three years or more." For those that had websites, only 62 per cent had published all services provided to the public, and the majority had deficiencies related to publishing contact details, results of tenders and purchased, strategies, and action plans.

At the same time, there are good examples that stand out when it comes to provision of e-services. For instance, the Ministry of Transport allows citizens to request the renewal of their driver's license online and to go their nearest post office to pick it up and pay the related fee. In their online portal citizens can also access information about traffic violations and results of license examinations. The Ministry of Transport also has a mobile app, which makes it easier to renew one's driver's license by prefilling certain information before going to the ministry's branch office.

It is also possible for Palestinians to make online queries to the Land Register, such as regarding transactions related to land and apartments or to check purchase order transactions. One can also make a query to the Labour Register to check for work permit status for working in Israel or to the Post Register to track postal packages inside the state. Other services include the GeoMolg Platform for viewing geodata, the COVID-19 inquiry service, inquiry about the status of medical transfer transactions, applications for arbitration license and legal translation certificates, salary slip inquiry for civil servants, e-school service (for pupils, teachers, and parents), etc. E-services seem to be priced at the same level as their manual versions.

All ministries have new services in sight, which they would like to develop and are working in that direction. The interviewees mainly listed external factors that act as constraints, such as the unavailability

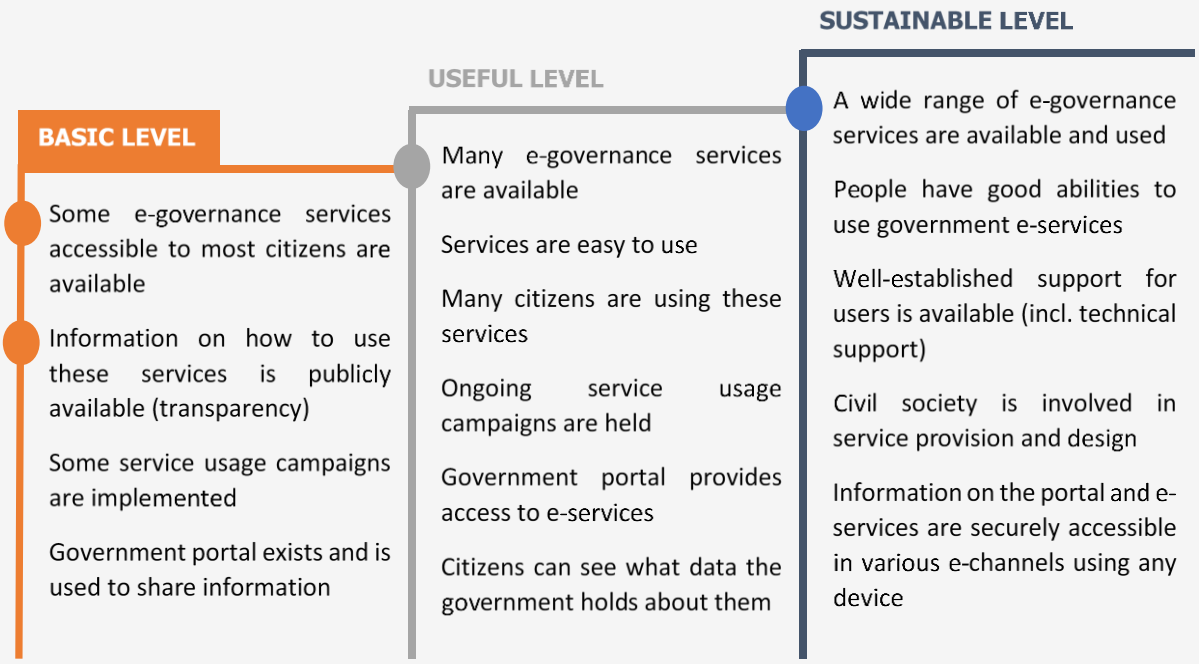
[121] See https://www.aman-palestine.org/cached_uploads/download/2020/10/06/12th-annual-report-final-1602000805.pdf.

of a nationwide authentication solution and payment solutions, but they also mentioned the need to update the legal framework.

MTIT is currently in the tendering process of creating a new government e-service portal, a single sign-on portal for the authentication of citizens using government provided e-services, a mobile app, and a payment gateway. The e-payment gateway will allow citizens and businesses to make online payments to the government, including payments for e-services consumed. This project is allocated $3.5 million and is carried out in cooperation with MTIT and the Palestine Monetary Authority and with the input of a multitude of further stakeholders.

To complement the new developments, post offices will be turned into one-stop-shops providing access to computers, printers, data connectivity, etc. This will provide citizens a good opportunity to use their single sign-on to consume public services. Some agreements between MTIT and ministries are already in place to provide certain certificates through post offices (e.g., between MTIT and the Ministry of Justice). However, as one interviewee pointed out, it will be a challenge to make sure that there are no delays related to the delivery of certificates after payment is made online. Other challenges include developing trust in electronic transactions and training public authorities to deal with them. There are plans in place for awareness-raising campaigns, and the Palestine Monetary Authority is negotiating with banks to persuade them to provide Internet banking access to all of their clients.

Figure 16. Access to Services – Maturity level: BASIC



Recommendations

Citizen/e-service portal. The unified e-government portal that is currently in the planning pipeline should offer an overview of all services (both manual and online) provided by different institutions in a one-stop-shop citizen portal manner. The portal must be accessible on different devices. Ideally, the information in

the portal would be automatically retrieved from the database of public sector databases, where each ministry and authority keep their data up to date.

Computer skills training and awareness-raising. Basic training on computer skills and use of e-services as well as general awareness-raising on e-government should be organized for different target groups (adults, the elderly, other vulnerable populations, including people with audio-visual disabilities).

2.10 E-participation, e-democracy

E-democracy is an integral part of a nation's digital transformation. The smart use of digital tools enriches and transforms existing governance models and practices, increasing the transparency, responsiveness, and accountability of government. It also offers citizens an additional opportunity to take part in political processes, resulting in better political outcomes for society as a whole. For successful e-governance it is beneficial to examine how it is possible to support civil society and encourage citizen engagement. This is a part of general computer literacy development.

Current situation in the State of Palestine

Citizen engagement does not seem to be in the responsibility area of any specific authority. Ministries usually provide citizens with an opportunity to request information or to provide feedback to services. However, the interviews did not reveal any regular procedures for proactive citizen engagement.

The government has launched an open data portal at https://opendata.ps. In October 2020 the portal included three datasets: on post offices and services, on licensed telecom providers, and on incubators and accelerators. The government should seek to open more datasets, including the use of Application Programming Interface (API) – a software intermediary that allows two applications to talk to each other.

According to Transparency International's Global Corruption Barometer 2019 focusing on the Middle East and North Africa,[122] 32 per cent of Palestinians claimed they were asked to pay a bribe and 17 per cent of public service users claimed to have paid a bribe as an expression of gratitude in the previous 12 months, both of which mark the highest percentages in the region. The report notes that a third of Palestinians has used their personal connections to get the public service they needed, but also points out the issues of sexual extortion and the offering of bribes in exchange for votes. Some 62 per cent of respondents felt that corruption had increased in the previous 12 months; 45 per cent thought that their government did well in tackling corruption; and 51 per cent felt that the government was doing poorly. Some 75 per cent of the respondents indicated that government corruption is a big problem; 56 per cent were not satisfied with the level of democracy in their country; yet 51 per cent felt that ordinary people can make a difference in the fight against corruption.

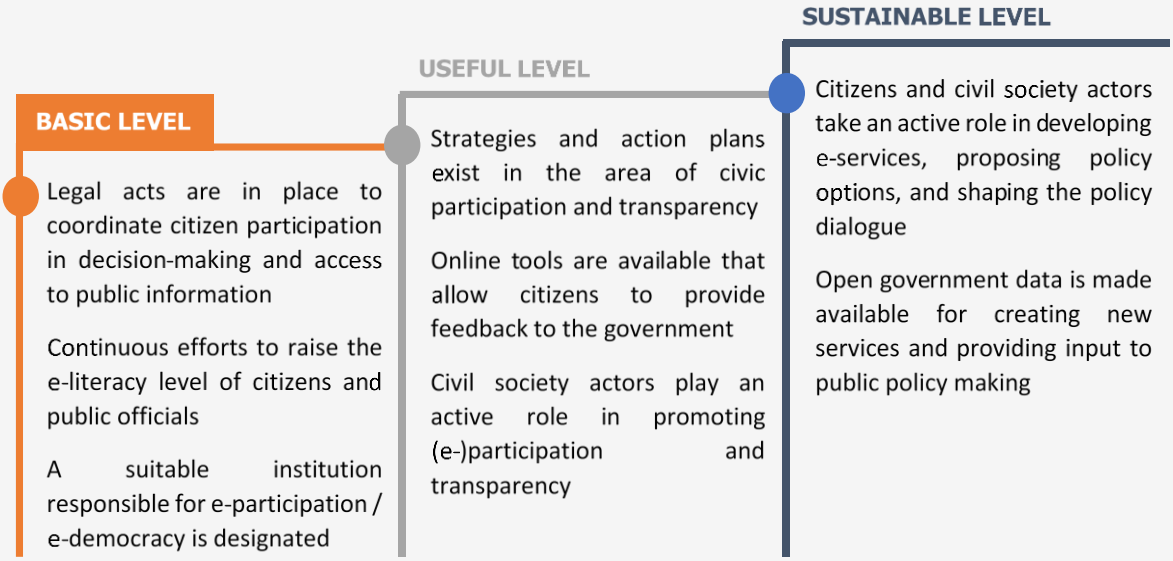
The 12th annual report of AMAN-Transparency Palestine[123] issued in October 2020 draws attention to the main challenges facing governance integrity and anti-corruption methods, which include the lack of accurate public information published, the poor transparency of actions and decisions of some government officials, opaque public sector recruitment procedures, the failure to pass certain laws (including the Access to Information Law), and the failure to form the Palestinian Telecommunications

[122] See https://www.transparency.org/en/gcb/middle-east-and-north-africa/middle-east-and-north-africa-1.
[123] See https://www.aman-palestine.org/cached_uploads/download/2020/10/06/12th-annual-report-final-1602000805.pdf.

Regulatory Authority – which would monitor the accountability of telecommunications companies and ensure fair competition among service providers. As one of the key recommendations, the report notes that "the government must urgently complete tools and procedures needed for the e-government to function."

It should be further noted that in October 2019 the government adopted the country's first whistle-blower protection system, which protects both public and private entities reporting corruption and guarantees their anonymity.[124]

Figure 17. E-participation – Maturity level: BASIC



Recommendations

Legal acts to coordinate citizen participation. The law on access to public information is a cornerstone of transparent and accountable government, which allows citizens to fully benefit from a digital government. It is important to prioritize facilitating access to information to restore citizens' confidence in official and constitutional establishments, which would go well hand in hand with the implementation of electronic archiving systems at ministries and institutions.

Proactive involvement of citizens. Continue developments related to the open data portal and establish an open data strategy. E-participation possibilities should be taken into account when developing the citizen/e-service portal. Use of crowdsourcing for citizen involvement in policy-making and implementation of accountability mechanisms (e.g., the Solve It[125] citizen engagement initiative by the Palestinian Prime Minister's Office and UNDP's Programme of Assistance to the Palestinian People, use of IT tools for awareness-raising and reporting on corruption, IT-tools for state budget transparency, etc.).

[124] See https://voices.transparency.org/building-a-whistleblowing-culture-in-palestine-564c935a9fc5.
[125] See https://www.solveit.ps.

2.11 Information security

The growing cyber threats in the world require public administrations to focus on e-governance security measures. It is important to be aware of the threats posed to e-governance. The coordinating institution is required to organize the development, monitoring, and supervision of relevant information security rules and measures. A designated organization in the form of a CERT/CIRT should be established, proper audit processes established, and all ministries and authorities should be aware of and use adequate security measures. The cybersecurity framework and the system of security measures should be established by legislation.

Current situation in the State of Palestine

The authority responsible for cyber security policy development in the State of Palestine is MTIT, which hosts the Palestinian Computer Emergency Response Team (CERT) since 2015. There is a cybercrime law in place since 2018, which has attracted some controversy regarding its proportionality. There is no cyber security strategy in place.

According to a report by the United Nations Economic and Social Commission for West Asia (ESCWA), the State of Palestine has an electronic crimes unit and a technical laboratory to investigate and detect electronic crimes.[126]

The national CERT is the national centre for information security, the first point of response for computer emergencies and a contributor to drawing up information security strategies and policies. CERT also contributes to raising awareness in the public sector as well as in society in general. Some seven people work at CERT, cooperating with network and security personnel in other ministries and in the security forces.

In early 2019, CERT carried out a readiness assessment survey in cybersecurity among 15 ministries and 20 government institutions in Palestine. The survey showed a shortage of qualified workers in the field of cyber security and a lack of financial resources allocated to support and develop the cyber security sector (e.g., lack of hardware and software to secure computer networks, inability to attract competent staff, lack of awareness among public officials).

It should be noted that the CERT website and social media channels have not been updated since November 2019. Based on the overview of activities provided by MTIT, CERT had dealt with two security events (related to geomolg.ps and courts.gov.ps) and published two security reports in January-September 2020. However, the Ministry of Interior pointed out in their interview that CERT had done a thorough review of their security practices in 2019, and there are concrete plans to expand the capacity of CERT by hiring new personnel, purchasing new hardware and software, and organizing additional training in the coming years.

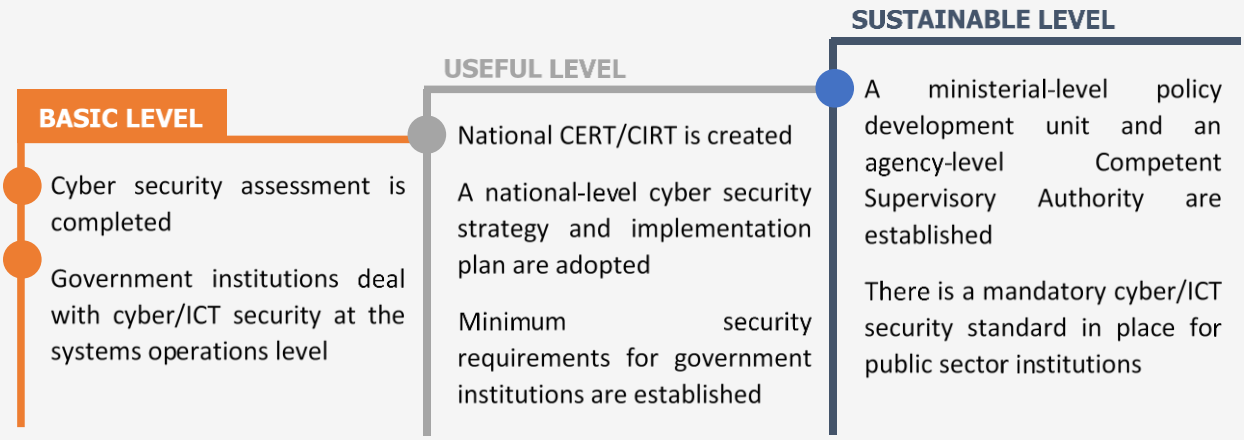
Based on the interviews with ministries, the main security controls applied include firewalls (several noted having next generation firewalls in place) and ministry-specific security policies. However, there are no nationwide standards for public authorities or digital service providers on information security issues. Guidelines and training for staff on cyber hygiene do not seem to be common.

[126] See https://www.unescwa.org/publications/arab-digital-development-report-2019.

According to MTIT, CERT is periodically reviewing the information security of specific authorities (e.g., the Ministry of Interior in 2019), but as information security remains a challenge for Palestinian public authorities, further funding has been set aside for security testing. In parallel, MTIT is working on establishing an Information Security Management System and has proposed a security policy based on international standards to the Cabinet for approval.

Although there is a cybersecurity committee at MTIT, ministries interviewed see the need for more cooperation on cyber security issues, including on standardization.

Figure 18. Information Security – Maturity level: BASIC



Recommendations

Cyber security strategy. Create the necessary components of cyber security policy development (cyber security assessment, strategy, implementation plan, policy unit, policy coordination format). Establish a regular cycle to review such components in response to changes in the environment and sectors.

Cyber security standards and requirements. Establish a cyber security standard for the public sector that all public sector authorities need to comply with. Identify essential service providers and set cyber security requirements for them to follow.

Training and awareness-raising. Develop cyber security programmes to enhance the skills of public officials and of the general population (e.g., cyber hygiene courses for public officials, information security campaigns for the public, cyber security guidelines for homes and offices, etc.).

2.12 Telecommunications and digital infrastructure

Access to ICT is essential as a basic prerequisite for e-governance. A minimum level of ICT infrastructure capacity is needed to implement e-governance projects. Communications networks are built by commercial companies, while the state's task is to regulate the development of the networks and provide favourable conditions for residents to access the network. For example, electronic communications legislation should be developed and enforced. It is the responsibility of the state to connect all national and local government agencies, schools, libraries, hospitals, and other public authorities using the existing network.

Current situation in the State of Palestine

According to the ICT Household Survey of 2019[127] conducted by the Palestinian Central Bureau of Statistics, Palestine had a mobile phone penetration rate of 91 per 100 inhabitants and 93 per cent of the population was covered by the cellular 3G networks. The average Internet speed was measured at 11 Mbps. Some 86 per cent of households have a smartphone; 33 per cent own a computer; and 80 per cent have access to the Internet at home. Further, 72 per cent of adults use the Internet and 90 per cent own a cellular phone (73 per cent own smartphones).

The Telecommunications Law was adopted in 1996 and is in need of an update. Until now there is no independent sector regulator in place, as the Palestine Telecommunications Regulatory Authority has not yet been set up due to the unstable political situation. A new law on telecommunications was developed in cooperation with ESCWA, which included the establishment of a Telecommunications Regulatory Authority, but the law is still in process of being adopted. According to the World Bank Economic Monitoring report from 2020,[128] the outdated law and lack of an independent regulator have resulted in "a lack of responsiveness and transparency to technical and regulatory issues, with a negative impact on consumers in terms of pricing and quality of service."

Nonetheless, the current telecommunications regulations allow for competition in the market and there are several private companies active in the field: one fixed (landline) provider (which also owns the national Internet infrastructure, PalTel)[129] and two mobile companies providing voice, text, and data mobile services (Jawwal and Ooredoo), with MTIT expecting a third company to enter the market according to the updated ICT Strategy. According to the ESCWA report on Arab Digital Development 2019,[130] fibre-optic networks are available for public and private-sector institutions, but not for private homes. Currently 2G and 3G standards are used, as Israel does not allow Palestine to use the frequencies and spectrum for 4G and 5G despite a resolution adopted by the 2019 ITU World Radio Communications Conference calling on Israel to cease obstructing 4G and 5G for Palestine. Moreover, importing the related equipment is very difficult. MTIT recognizes this as one of the main challenges to digital transformation.

In particular, this limited communications technology has caused issues during the COVID-19 pandemic as teaching was organized online, and there are still issues with Internet connectivity and speed. Indeed, the connections speed is often just 4 Mbps, which does not meet the needs of households and businesses. The Ministry of Finance has held discussions with Internet service providers to find solutions to improve access, but this is not the only issue, as many families also do not have laptops or enough devices for all students in the family to attend e-school.

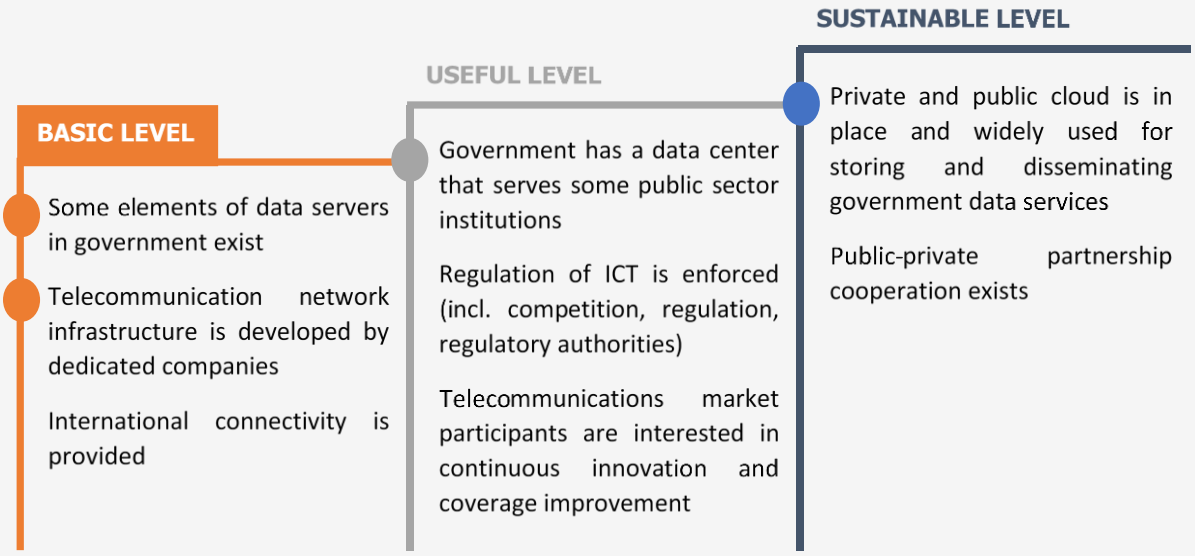
The Ministry of Telecommunications and Information Technology through the Government Computer Centre hosts the secure government network (a virtual private network), which is compulsory for all public authorities to use. The ministry also provides other infrastructure for other ministries to use, such as central anti-virus programmes and firewalls together with services such as developing websites for other ministries and helping with programming. The capacities of the government computer centre will soon be

[127] See http://www.pcbs.gov.ps/Downloads/book2510.pdf.
[128] See http://documents1.worldbank.org/curated/en/844141590600764047/pdf/Economic-Monitoring-Report-to-the-Ad-Hoc-Liaison-Committee.pdf.
[129] See https://www.unescwa.org/publications/arab-digital-development-report-2019, p. 41.
[130] Ibid.

expanded with an anticipated $1.3 million for cloud computing and disaster recovery (at a back-up location outside Palestine).

Most ministries use local hosting for all their systems, while some ministries also have back-up sites and high-availability instances available. Although MTIT provides cloud services on request, most interviewees stated that their organization does not use cloud services.

Figure 19. Telecommunications and Digital Infrastructures – Maturity level: BASIC



Recommendations

Wider WiFi access. As an alternative to the existing limitations on new mobile network generations rollout, focus can be turned to wider access to WiFi. The importance of lightweight multimedia design for public services should be kept in mind.

Free mobile access to government websites. Access to government websites from mobile operators' data networks should be free, that is, it should not affect a user's data allowance.

Development of government network. Continue the joint data network initiative involving all public authorities to ensure connectivity and the general functioning of the e-government system.

2.13 International cooperation

In order to benefit from the advantages that e-governance can provide for international relations (trade, free movement, research and education, etc.) it is important for states to take part in international cooperation (regional or other). Such cooperation helps states to learn from one another and to develop joint projects.

Current situation in the State of Palestine

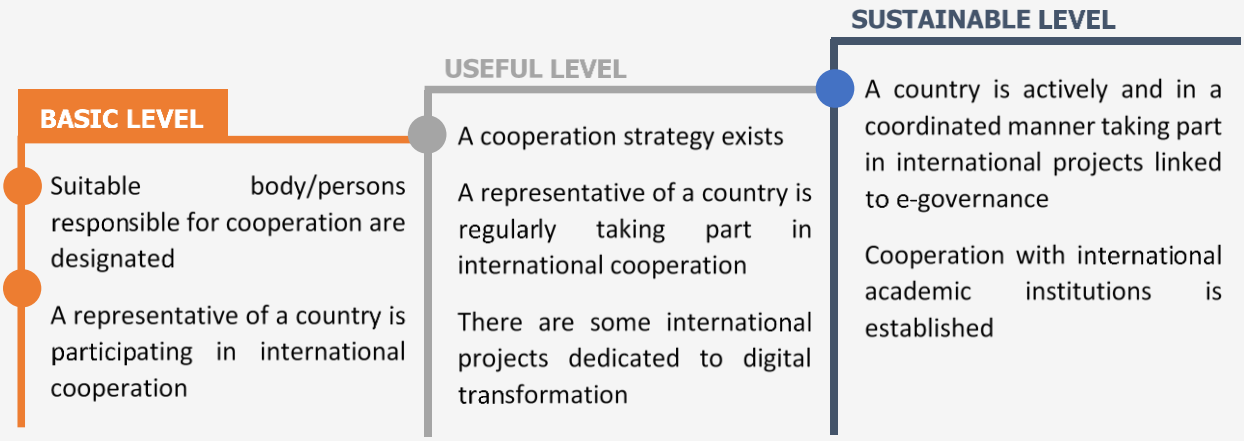
Government authorities are keen on international cooperation in the field of e-government; and according to MTIT, e-government-related issues are being followed up on. However, even if MTIT can be considered as responsible for e-government cooperation, there does not seem to be a strategy and clear process related to coordinating international cooperation in the field of e-government.

All ministries and authorities interviewed provided examples of cooperation with international counterparts, when asked (e.g., the General Personnel Council has exchanged experience on organizing examinations with Belgium; the Ministry of Finance has cooperated on the provision of public services by establishing a connection between the customs offices of Palestine and Jordan; etc.).

Other examples of bilateral cooperation include the collaboration with Estonia on the implementation of the X-Road secure data exchange solutions, for which the State of Palestine has also signed a Memorandum of Understanding (MoU) with Estonia, as well as with the United Arab Emirates.

According to the ESCWA report, the State of Palestine takes part in the Arab Forum for Internet Governance.

Figure 20. International Cooperation – Maturity level: BASIC



Recommendations

Digital diplomacy. Ensure that the presence of foreign policy and international relations is well represented in digital channels. A position or a department responsible for representing Palestine and its digital transformation interests should be established as part of Palestine's foreign policy activities. These interests need to be presented to other countries and international organizations as well as to technology companies.

It is important that government-to-government initiatives on international cooperation have clearly articulated aspirations on the digital transformation of Palestine and that MoUs between governments include specific action points with a focus on digital initiatives.

Palestine should actively seek digital cooperation models with international organizations that are delivering appropriate competences, reference models, and support on digital initiatives (e.g., ITU, OIC-CERT, participation at international e-government events such as the World Summit on the Information

Society Forum, etc.). Further, Palestine should actively reach out to technology enterprises for wider and more in-depth platform collaboration.

2.14 Digital maturity of Palestinian municipalities

To look into the digital maturity of larger Palestinian municipalities, 17 of them were invited to take part in a digital maturity assessment survey. Of these, six municipalities submitted their responses:

- Beit Jala (population 17,500)
- Hebron (population 350,000)
- Al-Bireh (population 85,000)
- Khan Younis (population 285,000)
- Ramallah (population 70,000)
- Gaza (population 700,000)

A summary of the survey responses is provided below together with recommendations to the municipalities as well as to the central government to support the digital development of Palestinian municipalities.

2.14.1 Strategy

In most of the municipalities that responded to the survey, responsibility for digital strategy planning and implementation lies with an IT department. However, in Beit Jala the responsibility is with the planning unit and in Al-Bireh it is divided among all municipal departments.

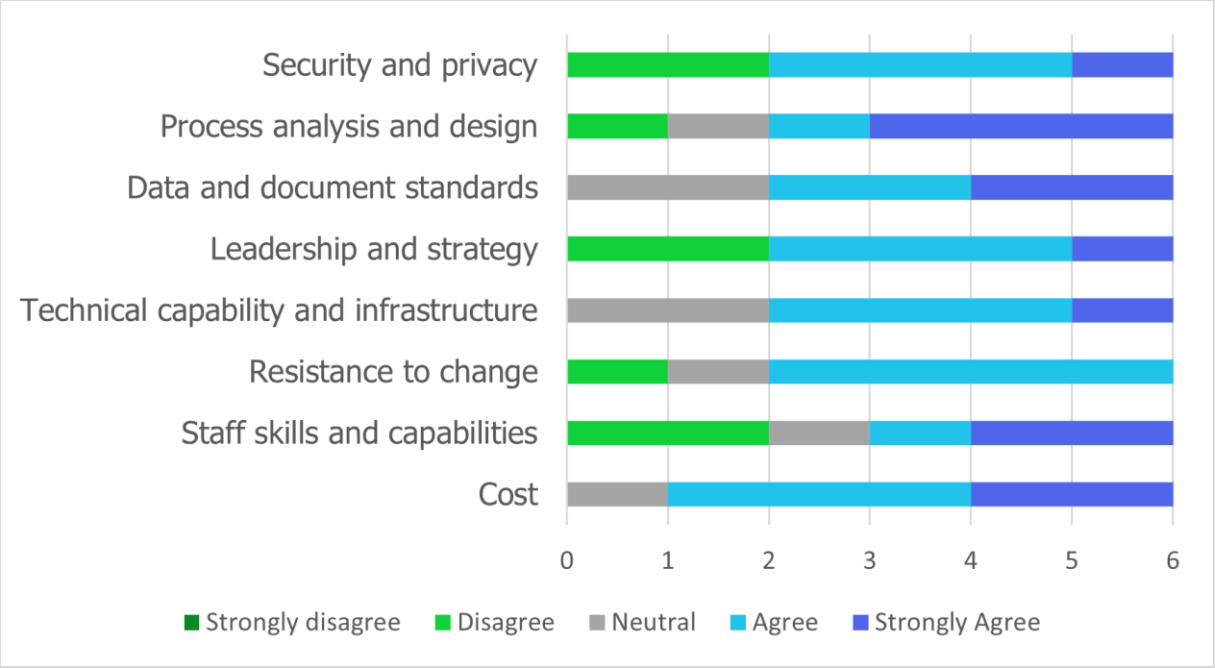
It is noteworthy that the municipalities of Al-Bireh and Khan Younis have both adopted strategic plans to become e-municipalities. Ramallah has an Urban Resilience Strategy, which supports community resilience through investing in smart city approaches. Five out of six municipalities have strategies in place that include priorities related to e-government. These can be largely divided into two: (i) priorities related to public service provision to citizens and (ii) the development of internal processes. On the one hand, local governments are working on developing their e-service channels (web portals, mobile applications, social media), specific services (GIS, transport, housing, ICT in education), and digital infrastructure. On the other hand, attention is turned to digital archiving, financial and human resources management, internal communication, virtual meetings, and efficiency of work.

The main metrics that the six municipalities have in place to measure progress related to digital development include website activity (6), social media presence and response (6), service request response time (5), digital interactions with the public (5), performance against digital plans (4), and digital interactions with businesses (3). Most of the municipalities do not measure energy consumption of ICT operations.

All six municipalities have a specific budget designated for ICT. Apart from one, all municipalities base their ICT budgeting on their long-term digital strategy.

Municipalities see a lot of challenges on their digital transformation journey. Three of the municipalities indicated that process analysis and design constitute a major challenge, and five stated that the cost of digital development is an issue.

Figure 21. To what extent do you agree that the following items are a challenge for your municipality on the digital transformation journey?



All municipalities agreed that digital delivery of services is the way of the future. Only one believes they currently have too many paper-based forms, whereas five believe that they are doing enough to implement digital technologies.

2.14.2 Data and internal processes

All six municipalities use electronic records and document management systems (e.g., for financial management and reimbursements, human resources management). One municipality noted that all of their documents are in electronic form except for those related to signing of payments, as the law requires these to be on paper.

Internal procedures are archived electronically in five of the municipalities, with Hebron noting that all such communication must be in electronic form or it is not accepted. Ramallah, however, noted that certain documents need to be archived on paper, as required by law.

All municipalities were asked to estimate what percentage of data in their registers is in digital form. The answers varied from a low of30 per cent (Beit Jala) to a high of 90 per cent (Gaza, Hebron), with an average of 70 per cent. All municipalities have on-site servers to store data, one municipality has an offline backup, and three have data backed up in cloud systems.

Three of the six municipalities have solutions in place to share data between their municipal registers and databases to provide services (e.g., Gaza uses standard database connections through fibre optic connections and web APIs; Ramallah has CRM fully integrated with ERP and linked to e-service channels). Two of the municipalities also have access to databases and registers at the central government level.

2.14.3 Digital skills

All municipalities stated that recruitment and retention of ICT staff does not present difficulties for them.

The six municipalities evaluate the skills of their non-ICT staff as “good” when it comes to the use of office software, making Internet-based voice and video calls, and use of professional online communities. The results are a bit more varied regarding the use of technologies for teamwork and collaboration, project management using digital tools, planning and conducting ICT procurements, and application of safety and security measures. Non-ICT staff seem to have challenges with understanding and using databases, but no further critical areas were identified where skills would be assessed as below average. All municipalities claim that their staff’s understanding of the benefits of digital tools and digital transformation as well as their willingness to explore new digital development is “high” or “very high.”

All municipalities evaluated the skills of their ICT staff in all these categories as “excellent” with very few exceptions.

ICT training is provided to public officials (including ICT staff), but not regularly. Despite admitting that there is room for improvement regarding ICT skills, only one municipality claimed to have regular ICT training for non-ICT staff.

2.14.4 E-services

The municipalities use a variety of digital technologies and channels. All have a website and a Facebook page in place. Five of the six have developed mobile applications. These provide services to both citizens and businesses, allowing them to access information about the municipality and its news, submit queries and complaints, follow up on applications, pay taxes, access maps, etc. Regarding the different technologies in use, Hebron also referred to their smart traffic light control room service and smart water metering system.

All municipalities provide wireless connectivity at their local administration, and four have established Internet access points (e.g., in libraries and public offices).

All six municipalities provide most of their services online. In all municipalities it is possible to submit complaints and report incidents electronically and to apply for commercial registrations and licenses online. In five cases, digital interactions are available for urban planning and development. Four municipalities have e-services related to utilities (electricity, water, waste, etc.), and four allow electronic payments, which is linked to e-wallets licenses granted by the Palestine Monetary Authority. Only one municipality has a solution for e-health and none provide digital solutions for public transport (e.g., e-tickets, real-time traffic monitoring).

Despite the various online channels in place, however, citizens still mostly prefer to interact with the municipality in person. The second most popular means of interaction is by phone, and electronic communication follows in third place.

According to the municipalities, the main factors preventing them from offering more services online include limited resources (financial and human), an outdated legal framework (the need to handle signatures and stamps on paper, missing legislation for e-payment), absence or low quality of central government databases, as well as the lack of public awareness and a resistance to change.

2.14.5 Recommendations

Common online platform for municipalities. It should be seriously considered to establish a common e-services platform that could be modified and used by all Palestinian municipalities.

Digital cooperation between municipalities. Ensure stronger cooperation of municipalities on their digital initiatives and roadmaps with the aim to consolidate the scarce financial and human resources and avoid overlapping of similar initiatives.

Legal review. Carry out an audit on the legal limitations and recommendations of simplifying and digitizing existing service processes of municipalities.

Joint communication campaign. Establish a joint promotional campaign to increase public awareness of digital services offered and reduce resistance from citizens towards consuming e-services.

2.14.5.1.1 Questionnaire responses

The main Digital Maturity Assessment questionnaire was completed in by the Ministry of Telecommunications and Information Technology.

Responses to the questionnaire targeted at larger municipalities (see Annex 1B) were received from the following six municipalities mentioned at the beginning of this paragraph 2.14.

Overview of key recommendations

Critical

1. Adopting the necessary legislation and setting up relevant authorities: Work on adopting pending legal amendments should be pursued more actively and without further delays. Legislation on access to information and data protection as well as an updated telecommunications legislation and digital transactions legislation are essential for Palestine's further digital development. Authorities responsible for the enforcement of these laws need to be set up.
2. High-level strategic coordination: A high-level coordination body should be mandated and enforced to set the national digital agenda (across sectors) as well as to harmonize and prioritize different digital transformation programmes. Policy development within the international cooperation framework also needs to be further enhanced.
3. Investments with clear socio-economic impact: There should be political drive and responsibility behind promoting digital transformation. Political priorities need to be translated into tangible digital services and financing priorities with measurable social and economic impact. The rollout of these services should be monitored and reported to the political leadership level. Metrics, such as timeline and key performance indicators, must be an inseparable part of the strategy and periodically (e.g., semi-annually) monitored through reports to the government level.
4. Financial framework of e-government: The annual operating budget for digital expenditure needs to be articulated clearly at the level of ministries and agencies. Development of new digital solutions and infrastructure of all ministries and agencies needs to be addressed in similar financing templates that indicate the Key Performance Indicators of the investment as well as the expected impact.

5. Provision of e-services: Careful implementation of the e-payment/single sign-on project is essential to the development of further e-services and to establishing an effective one-stop-shop citizen portal of e-services offered by Palestinian public authorities.

Important

6. Interoperability standardization and assurance body: To manage risks related to large IT projects, it is recommended to establish or mandate and enforce an interoperability standardization and assurance body to sign off on all new digital development projects of all ministries and public agencies that create new services and/or new databases and have a budget exceeding a certain budget (e.g., $1 million).
7. Digital identity management strategy: A comprehensive analysis on the legal, organizational, and management aspects of digital identity management is needed to develop a strategy and action plan for identity management development, together with a selection of the token(s) of digital identity to be used and the necessary human resources, skills, and communication efforts.
8. Wider Wi-Fi access: As an alternative to the existing limitations on new mobile network generations rollout, focus can be turned to wider access to Wi-Fi. The importance of lightweight multimedia design for public services should be kept in mind.
9. Cyber security strategy, standards, and training: The development of cyber security activities should be guided by a cyber security strategy, which builds on an assessment of cyber security capacities and sets out a strategy and implementation plan for the next years. In addition, a cyber security standard should be established for the public sector together with cyber security requirements for essential service providers and training for public officials and the general population.

Necessary

10. Reinforcing digital skills: To further raise the level of digital skills, training courses should be provided to both public officials and citizens based on skills assessment and carried out with the possibility to obtain a certificate of completion. Since digital services and infrastructure are critical for society, cyber hygiene and individual cyber competences need to be set as standard for not only civil servants but for the whole society.
11. Proactive citizen engagement through online tools: The use of online tools can make a significant contribution to increasing transparency and reducing corrupt practices. Hence, it is recommended to continue developments related to the open data portal and establish an open data strategy, use crowdsourcing for citizen involvement in policy-making and implementation of accountability mechanisms, and make sure that e-participation possibilities are taken into account when developing the citizen/e-service portal.
12. Increased digital capacities of municipalities: It should be seriously considered to establish a common e-services platform that could be modified and used by all Palestinian municipalities. Stronger cooperation of municipalities should be ensured on their digital initiatives and roadmaps with the aim to consolidate scarce financial and human resources and avoid overlapping of similar initiatives. Moreover, a joint promotional campaign should be considered to increase public awareness of digital services offered and to reduce resistance from citizens towards consuming e-services.

13. Digital diplomacy: Ensure that the presence of foreign policy and international relations is well represented in digital channels. A position or a department responsible for representing Palestine and its digital transformation interests should be established as part of Palestine's foreign policy activities. These interests need to be presented to other countries and international organizations as well as to technology companies.

Digital Landscape Assessment

- Rapid Integrated Assessment
- Digital Maturity Assessment
- Accelerator and Bottleneck Assessment

3 Accelerator and Bottleneck Assessment

3.1 Objective

As part of the third component, UNDP conducted the Accelerator and Bottleneck Assessment (ABA) in the State of Palestine as part of the Digital Landscape Assessment, with the main objective of mapping key digital interventions that are being implemented across sectors, identifying bottlenecks to implementation, and recommending possible solutions to those bottlenecks. To carry out the assessment, the UNDP team conducted a series of meetings with key representatives from different sectors, including with more than 10 ministries, academia, and the private sector.

3.2 Framework and methodology

The bottleneck assessment provides a systematic approach methodology that consists of the following three steps:

Figure 22. Three-step approach to carry out the assessment

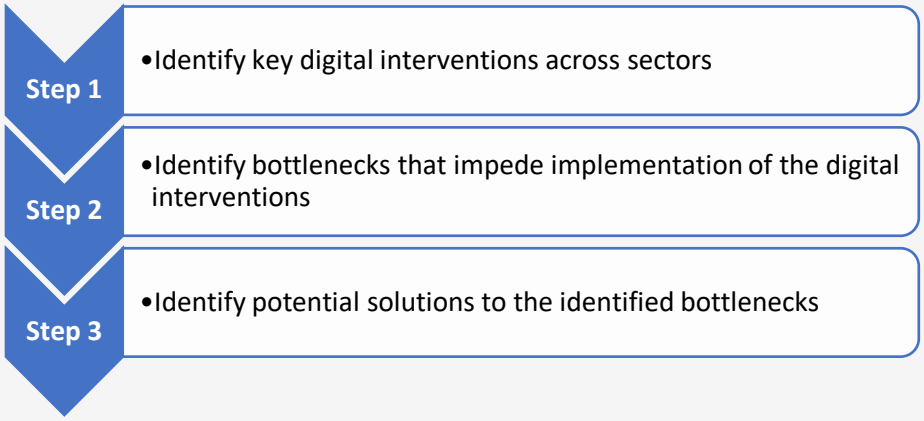


Table 2 below outlines the five broad categories of bottlenecks at the policy and implementation levels as well as its subcategories. While this overview cannot be considered exhaustive, it is illustrative of the types of bottlenecks that are usually present in the policy making and implementation processes. Table 5 ahead provides an overview of the bottlenecks identified in the case of Palestine for each of the five categories.

Table 2. Bottleneck categories impeding digital interventions

Bottleneck categories	**Policy & planning**	**Budget & financing**	**Service delivery (supply)**	**Service utilization (demand)**	**Cross-cutting**
Subcategories	Political will and concerned interests	Resource mobilization	Geography and demography	Empowerment and self-efficacy	Engagement and advocacy
	Strategies, policies, and plans	Resource allocation	Human resources, skills	Acceptability	Coordination and alignment
	Legislation and enforcement	Resource expenditure	Equipment and supply	Accessibility and affordability	Accountability and transparency

	Institutional capacities		Quality and equitability	Inclusiveness (are there barriers for specific groups to access services?)	Communication
	Coordination and alignment		Inclusiveness (are adequate services offered for marginalized groups?)		
	Accountability and transparency				

3.2.1 Stakeholders Interviewed

Over a period of three months the UNDP team has conducted interviews with key stakeholders, including representatives from over 10 ministries, academia, and the private sector to map key digital interventions across sectors, progress of these interventions and their links to the SDGs, as well as bottlenecks to implementation.

Table 3. List of stakeholders interviewed

Stakeholder	Interviewee
Bir Zeit University	• Iyad Tumer, responsible for all undergraduate programmes
Environment Quality Authority	• Zaghloul Samhan, Director-General of Policies and Planning, Environment Quality Authority • Ahmed Abou Taher, Director-General, Environment Quality Authority
Higher Council of Innovation and Excellence	• Maysoun Ibrahim, Member, Board of Directors • Razan Nasr, Head, Stimulation and Exploration Department
Ministry of Agriculture	• Andallah Lahlouh, Deputy Agriculture Minister • Moussa and Toufic, IT Department
Ministry of Finance	• Anas Shahada, Policy Advisor and Projects Director • Leila Ghreib, Manager, International Affairs and Programmes
Ministry of Higher Education	• Monther Salahat, Head, Database Department • Ahmed Othman, Director-General, Research and Development
Ministry of Interior	• Aktham Namoora, General-Director, IT Department • Malek Chehade, Manager, Development Department
Ministry of Justice	• Samah Naser, Head of planning, Head of national team of SDG • Hanane Yaghi, Head of IT
Ministry of Labour	• Shafik Khayyat, Head, ICT Department

Stakeholder	Interviewee
	• Haydal Rabii, Programme Manager, Department of Relations and Fundraising
Ministry of Telecommunication and IT	• Rami Jaber, E-Government Department • Yousef Ertahi, eGovernment Department • Fadi Mourjani
Ministry of Women's Affairs	• Hanna Nakhleh, Project's Advisor
Palestinian Central Bureau of Statistics	• Amjad Harb, Director-General, Information Systems • Haleema Said, Director-General, International Relations Directorate • Mustafa Khawaja, Director-General, Registers and Statistical Monitoring Directorate • Reham Mualla, International Relations Directorate
Paltel (SoE Telecom)	• Nizar Shanaah, IT and Digital Director • Samah Abouaoun Hamad, General Manager, PALTEL Group Foundation

3.3 Digital interventions across sectors

The following table maps the key digital initiatives across ministries and entities based on the information collected through the interviews with key representatives.

Table 4. Key digital initiatives across ministries and public-sector entities

Institution	Digital intervention
Bir Zeit University	• Digitized and automated some of the internal services and administrative work within the university. • Shifted to online course delivery modality in response to the COVID-19 pandemic. • Exploring the option of using open-source applications like BigBlueButton for education purposes (webinar, e-learning).
Environment Quality Authority	• Build a repository with information on around 1,500 industries, collected through an industrial environmental survey. • Developed GEOMOLG (https://geomolg.ps/) – an integrated spatial information system. • Developing a larger platform for complete information, awareness, training, complaints, approvals, procedures, etc.

Institution	Digital intervention
Higher Council of Innovation and Excellence	• Organized five forums, with the last two being directly related to the ICT sector; the 4th national forum addressed the topic of the fourth industrial revolution and related innovation. • Working to organize a training for Palestine entrepreneurs about new trending technologies, including ML, AI, IoT. • Plan to develop a platform to connect all Palestinian ministries and public bodies. By connecting the Higher Council with the Ministry of Economy it would allow smoother registration of start-ups and effective implementation of related processes.
Ministry of Agriculture	• Launched an animal identification system (developed with the Food and Agriculture Organization), which assigns a number/ID for each animal and helps with the surveillance and tracking of animals. • Launched a system that sends SMS notifications to farmers with weather forecasts. • Plan for online payment system.
Ministry of Finance	• Developed a revenue management system that calculates taxes, TVA, etc. • Developed software on property taxes. • Established a governmental financial procedure, which is being continuously maintained and enhanced. • Created a salary system with related enhancements and updates. • Working on an online payment project for future release.
Ministry of Higher Education	• Launched a Graduation Tracking System to collect information on graduates and their entrance into the labour market. • Established a Tertiary Education Management and Information System that collects data and automates collection of data from institutions' sites. The objective is to collect and use historical data from colleges and universities across Palestine to inform and formulate statistical reports for the Ministry to support decision-making. • Planning to develop a warehouse containing data collected from universities. • Planning to develop a dashboard to publish data open and accessible to the public and to other national and international public-sector entities.
Ministry of Interior	• Carrying out a project for passport applications. • Carrying out a project on biometric management.
Ministry of Justice	• Developed several automated systems, including the archiving system for digitization of documents to make workflow more efficient within the Ministry. • Providing access on the Ministry website to some digital services for Palestinian citizens, such as e-application for a certificate of arbitration. • Planning to release other digital services targeting citizens, including the criminal records service. • Planning to develop web services to be part of the e-justice project.
Ministry of Labour	• Created a digital application that contains the information and records of workers within the green line.

Institution	Digital intervention
	• Established a database for the inspection sector with information on workers in Palestine. • Established a Labour Market System whereby citizens can register and submit their profile data. • Established an archiving system. • Established a GPS system for monitoring vehicles attached to the Ministry.
Ministry of Telecommunication and IT	• Created an e-payment framework with a gateway and single sign-on available on both web and mobile platforms. • Offering several services, including virtual private server (VPS), websites hosting, and Domain Name System (DNS) registration for many governmental institutions. • Planning to upgrade X-Road to the latest version. • Planning to build a disaster recovery site outside Palestine.
Ministry of Women's Affairs	• Established a system, linked to the Ministry of Interior and police through the X-Road, to lodge complaints related to domestic violence. • Offering digital services related to gender audit and budgeting. • Established an internal digital library system. • Planning to release a mobile application that will enable access to reports and statistics as well as to register complaints.
Palestinian Central Bureau of Statistics	• Developed internal applications to enhance their business processes, such as applications for administration, HR, and financial procedures. • Managing social media platforms such as Facebook, Instagram, Twitter, and YouTube to serve as a communication strategy with the public. • Gathering data through a tablet application and displaying it on GIS systems.
PALTEL	• Developed a mobile application for customers on the Play Store to provide support for clients. • Providing intensive coding courses in partnership with Stanford University (United States) to teenagers and university students. Topics covered include data science, data analysis, and other labour market-related specializations.

3.4 Bottlenecks to implementation of digital initiatives

The table below provides an overview of the bottlenecks under the five broad categories that have been identified through discussions and interviews with ministries, academia, and private-sector representatives.

Table 5. Bottlenecks identified within the five categories

Bottleneck categories	Policy & planning	Budget & financing	Service delivery (supply)	Service utilization (demand)	Cross-cutting
Subcategories	Political will exists at high level while there is limited engagement of key stakeholders in the development of the national digital transformation plans.	Unstable source of funding, limited public resources available and human resources capacities dedicated to ICT technologies and related activities (IT procurement, skilling, etc.).	Political and security uncertainties, jeopardy to data, centres and lack of disaster recovery sites outside the State.	• Lack of awareness on innovation (low digital literacy). • Reluctance to share information and resistance to change.	Weak online presence for advocacy and communication.
	Limited role of MTIT in the development of sector strategies of line ministries.	Government only partially covers ICT-related expenses.	Difficulties in importing high-tech goods (telecommunication, biometric, etc.)	Services not fully automated.	Political issues: Israel-imposed constraints.
	Strict and rigid regulatory framework, hence difficult to modify.	• Strong dependency on donor funding. • Challenge to comply with donor policy and short-term implementation cycle.	• Telecommunication spectrum problems (no agreement with Israel) preventing roll-out of 4G technology. • Absence of policies to allow either 3rd part (cloud) or offsite backup for data storage and recovery.	Less utilization/uptake in some target areas/populations.	
	Lack of national policies and regulations related to entrepreneurship and innovation.	• Difficulty to retain internal expertise due to limited budget. • Remuneration in the public sector is not competitive compared to the private sector/labour market.	• Low and uneven institutional capacity and IT skills across ministries. Outsourcing is commonly used to fill this capacity gap. • Limited know-how on industrial best practices.	High prices and limited availability of ICT equipment both for citizens and for ministries to support data centres.	

Bottleneck categories	Policy & planning	Budget & financing	Service delivery (supply)	Service utilization (demand)	Cross-cutting
	Gaps in the ecosystem: angel funding, tax breaks, legislative, and access to markets.	Digital services are not financially self-sustained.	Problematic data exchange, no access to documentation/support on government business (X-Road)	Unavailability and/or malfunctioning of official ministerial websites.	
	Lack of specific legislation, regulation, and incentives to promote start-ups	Low funding level for universities and R&D initiatives.	Use of different IT system, absence of shared data Centre among public entities and IT personnel		
	Low level of patenting.		Low collaboration and coordination among entities.		
			Poor electricity supply, affected by frequent black-out.		

3.4.1 Policy and planning

In general, any digital service should go hand to hand with legislation. In the Palestinian context, it is not an easy process to create new laws or modify existing ones in order to plan, launch, and maintain digital services. Legislation procedures are not straightforward, and it takes a lot of time for them to be executed. The legislative process does not effectively function in the State of Palestine as the Legislative Council has been inactive since 2007. However, the Basic Law allows the adoption of legislation by Presidential Decree.

The political buy-in exists at the highest level to advance digital transformation in the State of Palestine. MTIT leads the digital transformation efforts, and is responsible for collecting, analysing, and articulating the digital needs of the entire Palestinian public sector, including articulating government-wide digital strategies. Yet some stakeholders have noted that the role of MTIT has been mostly limited to providing technical support, while support is needed in the development of their sectoral strategies. Another key challenge highlighted by some stakeholders is that they have had limited engagement in the development of the national digital strategy.

Stakeholders also noted the need to put in place specific policies and legislation that would facilitate the digital transformation process, including start-up legislation and patenting.

3.4.2 Budget and financing

Most of the digital/ICT projects in the ministries and in public entities rely on an unsustainable and single source of funding, which is tied to the economic situation, and funds allocated to each ministry by the government. Due to these limited resources, ministries are forced to prioritize other key activities at the

expense of the implementation of digital strategies. In many cases, the ministries seek international donor funding for initiatives, becoming highly dependent on the international community's support. This approach affects the speed, and consequently the relevance, of the digital transformation projects when implemented.

Further, donor-funded projects face challenges when the funds run out or at the end of the project lifecycle as the lack or limited funds affect the continuity of the activities. Many ministries lack funds for maintenance and upgrades related to their digital projects, and in the absence of continued funding the responsible ministry is unable to complete delivery and guarantee the implementation of the technology. This hinders the sustainability of digital systems, especially in terms of progress towards a fully automated system.

A major challenge noted by representatives from the ministries is the difficulty in retaining skilled IT staff given the limited funding and the lack of incentives to keep them on the job. As a result, many ministries rely on outsourcing as a short-term solution and do not invest in their in-house resources.

Finally, representatives from academia noted limited financial support for digital initiatives from the government. Most of these academic institutions rely on fundraising, and they usually receive assistance and funding from alumni and diaspora. This financing bottleneck impedes their ability to offer online education and digital training in an inclusive way, thus leaving people behind.

3.4.3 Service delivery (supply)

Political and security uncertainties, especially any prospective conflict with Israel, might put data centres in jeopardy and result in the permanent loss of data. The State's data is stored in the data centres of ministries and at the MTIT site with local backups.

A key challenge noted by stakeholders is the restrictions placed by the Israeli border control on importing digital and telecom equipment. There are instances where equipment such as firewalls and routers have not been cleared by the Israeli border control in time to address server issues and ensure business continuity. Furthermore, these restrictions have limited the West Bank to 3G networks and Gaza to 2G while countries across the world are considering the use of 5G.

The existing X-Road – an open source data exchange system – is old and imposes many challenges. The Digital Maturity Assessment has identified the need to upgrade the X-Road to a newer version, and the country is working on this front. However, some stakeholders expressed their concern in adopting the new version of X-Road due to the technical difficulties faced in the past as well as limited technical knowledge of the staff.

One of the key bottlenecks highlighted is the dependency of many ministries on their own data centre, rather than on a centralized data centre or cloud service. This would, however, entail a need for considerable budget to upgrade the hardware and cover maintenance. Another challenge is the availability of highly skilled technical staff within ministries to provide related technical support.

Limited know-how of the technical teams within ministries on industrial best practices and the latest technologies is pushing many ministries to outsource the development of their digital services to

international technology firms. This is not a sustainable solution in the long-run and is also not cost-effective.

Finally, frequent electricity blackouts remain a considerable bottleneck, where lack of generators and adequate fuel impedes business continuity.

3.4.4 Service utilization (demand)

Service utilization is generally impeded by the lack of awareness and resistance to change among the general public. For example, when Beir Zeit University launched online education during the COVID-19 pandemic, many university members – including instructors as well as students – were resistant to this change due to their lack of awareness and knowledge on how to use online education systems. This called for the provision of specific training to overcome this challenge.

The lack of awareness and knowledge of digital services remains a considerable bottleneck and limits the use and uptake of governmental digital services by citizens and business. Many Palestinians are reluctant to use governmental digital services due to their fear and lack of trust in putting personal and private information online. Many simply lack the knowledge to use online services.
The high costs of computer equipment and a reliable connection continues to be a major challenge for Palestinians and thus impedes the utilization of public and private digital services.

The lack of adoption by all ministries of a single portal to provide citizens with access to all governmental services has also been noted as a key challenge. Further, in many instances, governmental websites are not operational or they frequently malfunction, thereby impeding access to online services and official information.

3.4.5 Cross-cutting

Some of the bottlenecks identified during the interviews have a cross-cutting nature affecting several areas and resulting into challenges to develop, adopt, and implement digital strategies and technologies. In particular, the limited amount of information and data made public and accessible to all as well as the weak online activities for advocacy and communication have direct effects on how citizen perceive digitization and limits ministry interactions and the engagement of citizens.

Finally, the majority of bottlenecks are caused by the political situation and the resulting constraints and restrictions imposed by Israel.

3.5 Potential solutions

The table below provides a comprehensive set of solutions for each bottleneck category.

Table 6. Potential solutions to digital bottlenecks

	Bottleneck	Potential Solutions
Policy & planning	• Strict and rigid regulatory framework, hence difficult to modify	• Make legislative processes faster and more flexible for laws on digitalization and e-services.
	• Limited role of MTIT in the development of sector strategies of line ministries	• Leverage and strengthen the coordination role of MTIT and ensure support to ministries in the development of their strategies along with continued technical support.
	• Lack of national policies and regulations related to entrepreneurship and innovation	• Modify existing policies/laws or create new ones to incentivize digitalization and innovation (e.g., through Private Public Partnership or incentives to start-ups). These policies should also include advanced data privacy and cybersecurity.
	• Gaps in the ecosystem: angel funding, tax breaks, legislative, and access to markets	Create an innovative/ sustainable ecosystem by: • Developing laws facilitating access to market, creating fair competition and eliminating barriers. • Filling investment gaps through incentives to business or tax deferral to reduce dependency on private sector's sponsorship and international funding. • Adopt laws to ensure even public-sector investments in ICT technology (e.g., public procurement for innovation).
	• Political will exists at a high level while there is limited engagement of key stakeholders in the development of the national digital transformation plans	• Enable participation and engage key stakeholders – including line ministries, academia, the private sector, and civil society – in the development of the national digital transformation plan. This can be done, for instance, through co-creation workshop and co-design activities. • Define governance and clear roles and responsibilities in supporting the digital strategy implementation.

	Bottleneck	Potential Solutions
	• Lack of specific legislation, regulation, and incentives to promote start-ups	• Encourage private infrastructural or other investment (e.g., through laws on PPP, licensing/authorization) as well as tax incentives for start-ups willing to develop high-tech solutions applicable also to traditional sectors. • Enhance and release of upgraded policies related to opening job opportunities, especially cross-border ones, such as e-commerce.
	• Low level of patenting	• Modify existing patenting law to reduce bureaucracy and barriers to candidates and to optimize patenting issuance.
Budget & Financing	• Unstable source of funding and low public spending and resources capacities dedicated to ICT technologies and related activities (IT procurement, skilling, etc.)	• Strengthen coordination between the Ministry of Finance, MTIT, and the related ministries to ensure effective allocation of IT budget to support innovation and implementation of digital initiatives (e.g., Public Procurement for Innovation).
	• Government only partially covers expenses	• Prioritize funding for the implementation of national digital transformation strategies, plans, and projects.
	• Strong dependency on donor funding • Challenge to comply with donor policy and short-term implementation cycle	• Enhance public-private partnerships to support financing and implementation of digital initiatives. • Intensify dialogue with donors to align and prioritize vis-à-vis donors' policies and reduce aid constraints.
	• Difficulty to retain internal expertise due to limited budget • Remuneration in the public sector is not competitive compared to the private sector/labour market	• Hire and incentivize skilled ICT staff within ministries. Consider alternative (non-monetary) compensation such as internal rotation/mobility, exposure in public events, mentoring/tutoring/coaching, flex-time, retirement matching, memberships, etc. to attract/retain personnel
	• Digital services are not financially self-sustained	• Pursue better financial sustainability models, including innovative financing models, to support implementation of digital initiatives.
	• Low funding level for universities and R&D initiatives	• Create a sustainable funding ecosystem to secure resources for university and R&D. This

	Bottleneck	Potential Solutions
		could take the form of a hybrid ecosystem, merging government assistance, venture capital, and business angels coupled with a tight partnership between academia and tech-based start-ups/incubators.
Service delivery (supply)	• Political and security uncertainties, jeopardy to data centres, and lack of disaster recovery sites outside the State • Absence of policies to allow either 3rd part (cloud) or offsite backup for data storage and recovery	• Establish a disaster recovery site and data backup systems outside the State. • Implement government cloud data centre and provide requisite support to ministries.
	• Difficulties in importing high-tech goods (telecommunication, biometric, etc.)	• Seek continuous bilateral dialogue with Israel and the international community.
	• Telecommunication spectrum problems (no agreement with Israel) preventing roll-out of 4G technology.	• Provide affordable, equal, and high-speed access to the Internet for all (access to 4G/5G spectrum to local operators).
	• Limited know-how on industrial best practices	• Support digital skills development of the governmental staff, especially, but not limited to, the IT team. • Develop additional skills and promote knowledge sharing related to digital services to enhance government service delivery.
	• Problematic data exchange, no access to documentation/support on government business (X-Road) • Use of different IT systems, absence of shared data centre among public entities and IT personnel	• Advocate for open-source technologies, especially in key governmental solutions such as the service business. Involve ministries in the selection of the next generation of the data exchange platform.
	• Low collaboration and coordination among entities	• Enhance coordination among ministries and the creation of cross-sectoral solutions contributing to the SDGs.
	• Poor electricity supply, affected by frequent black-out	• Provide equal access to electricity. • Ensure emergency fuel to run back-up generators for critical facilities.
Service utilization (demand)	• Lack of awareness on innovation (low digital literacy) • Reluctance to share information and resistance to change	• Raise public awareness related to the benefits of using digital services. • Increase communication related to the benefits and opportunities of digitization.

	Bottleneck	Potential Solutions
		• Launch digital literacy initiatives targeting citizen, business, and academia. • Develop simple tutorials/trainings for each governmental service.
	• Services not fully automated	• Increase efforts in automating services, starting with pilots in the provision of critical services.
	• Less utilization/uptake in some target areas/populations	• Facilitate uptake of available technologies through tailored communication campaigns and incentives to use of digital services. • Ensure equal broadband connectivity penetration across the Palestinian territory.
	• High prices and limited availability of ICT equipment both for citizens and for ministries to support data centres	• Encourage private infrastructural investments in ICT equipment. Higher availability will result into market price adjustments.
	• Unavailability and/or malfunctioning of official ministerial websites	• Develop a unified and user-friendly e-government portal that provides access to a range of services and ensure that it is operational, secure, and safe at all times.
Cross-cutting	• Weak online presence for advocacy and communication	• Enhance coordination on the planning and implementation of digital initiatives across ministries as well as with academia and the private sector to leverage synergies and address overlaps for more efficient and effective implementation. See Figure 23 below on how digital initiatives implemented by various entities contribute towards a common goal.
	• Political issues: Israel-imposed constraints	• The Israeli-imposed restrictions on the import of digital goods need to be resolved bilaterally.

Cross-sectoral interventions

The figure below shows how cross-sectoral interventions can have multiplier effects and, in turn, help governments to align with the SDG targets and achieve the goals of Agenda 2030. The scenario illustrated in Figure 23 demonstrates how digital interventions aiming at empowering women can have positive multiplier effects and contribute to, among others, reducing domestic violence, supporting gender equality in education, and guaranteeing equal job opportunities for women.

Figure 23. Digital interventions to promote the empowerment of women