



Arab Digital Development Report 2019

Towards Empowering People and Ensuring Inclusiveness



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Economic and Social Commission for Western Asia

Arab Digital Development Report 2019

**Towards Empowering People and Ensuring
Inclusiveness**

Information and Communication Technology Policies Section
Technology for Development Division



United Nations
Beirut

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Preface

This Arab Digital Development Report (ADDR) is part of the Work Programme of the Economic and Social Commission for Western Asia (ESCWA) for 2018-2019. The publication studies digital development in the Arab region; analyses the current status of the information and communications technologies (ICTs) sector, on the one hand; and probes the existing linkages of ICTs to the process of sustainable development with its various policy dimensions, on the other.

Based on consultations with member States and partnering organizations, conducted by ESCWA during the first Arab High-level Forum on the World Summit on the Information Society (WSIS) and 2030 Agenda, Beirut, May 2017, the World Government Summit, Dubai, February 2018, and the WSIS Forum, Geneva, March 2018, this report is designed according to a well-defined thematic approach.

This thematic approach entails a framework that examines the status of WSIS action lines, and probes intersections of those action lines with the Sustainable Development Goals (SDGs) of the 2030 Agenda, in line with the periodically identified themes of the High-level Political Forum (HLPF) on Sustainable Development of the United Nations Economic and Social Council (ECOSOC) towards leaving no one behind in sustainable development. Hence, this edition of

the report provides a review of digital development in the Arab region, with an eye on the theme of empowering people and ensuring inclusiveness of societies, which is derived from ECOSOC's HLPF for 2019.¹

The thematic approach is also based on official inputs and contributions from participating member countries, whose national focal points worked diligently with the ESCWA core team to conduct their national reviews, namely the national digital development reviews (NDDRs), in a manner similar, but not identical, to the voluntary national reviews (VNRs) of the 2030 Agenda.

This thematic approach allows covering focus areas in a more targeted manner and potentially pave the way for the periodicity of this report on a biennial basis that will address priority aspects of the 2030 Agenda in a phased approach and will allow covering emerging trends and rapidly changing future perspectives.

A number of Arab countries, in cooperation with ESCWA, will use the NDDRs as a vehicle to develop their national digital agendas in a multidisciplinary fashion and through a dynamic approach that complements their national developmental strategies and plans aiming at implementing the 2030 Agenda.

ESCWA Publication Team

The Arab Digital Development Review publication has been authored by a core team from ESCWA, with contributions from several distinguished colleagues from ESCWA and member countries, partners and collaborators.

The core publication team was led by Mr. Ayman el-Sherbiny, Chief of the ICT Policies Section in ESCWA. This core team consisted of Ms. Mirna Barbar, Programme Management Officer in the ICT Policies Section, Ms. Zahr bou-Ghanem, Research Assistant in the ICT Policies Section, as well as Mr. Mansour Farah, ICT for Development Expert, and prime consultant of the ADDR report, in addition to support from Ms. Mais Hatem, ESCWA intern. The core publication team collectively developed the concept note, the guiding template and the related interdivisional, national and organizational partnership schemes; and produced successive versions of the manuscript in close coordination with other contributors and reviewers, enhancing narrative, data validation and gender dimensions. In doing so, the team worked closely with national focal points (NFPs) from ten Arab countries to produce successive versions of the National Digital Development Reviews (NDDRs) and parts of the report at different stages. The team also conducted two internal peer reviews and two additional external peer reviews. The core team received direct valuable substantive, administrative and programmatic support from no less than twenty ESCWA colleagues and/or experts.

Substantive inputs and reviews were received from Mr. Nawar al-Awa, ESCWA's Regional Advisor on Technology for Development in the Technology for Development Division (TDD), Mr. Moctar Mohamed el Hacene and Mr. Salim Araji from the Economic Development and Integration Division (EDID), Mr. Federico Neto and Ms. Gisela Nauk from the Social Development Division (SDD), Mr. Juraj Reican and Mr. Rami Zaatari from the Statistics Division (SD), and Ms. Mehrnaz al-Awady and Ms. Sukaina Nasrawi from the ESCWA Centre for Woman (ECW), in addition to Ms. Nada Darwazeh from the Gender Focal Point Network (GFPN).

The core team also received support from Ms. Rola Mehyo, Ms. Manal Tabbara and Mr. Khadijeh Mansour as part of administrative and support teams in TDD.

Mr. Abulilah al-Dewachi, ESCWA consultant and ICT4D expert, and Mr. Haidar Fraihat, former Director of TDD and currently ESCWA's Senior Advisor on Innovation and Technology contributed to the inception efforts.

At the final peer review stages, valuable feedback and comments were received from Mr. Yousef Nusseir, ESCWA consultant and ICT4D expert, and from Ms. Nibal Idlebi, Officer-in-Charge of TDD and Chief of Innovation Section.

Valuable feedback, comments and insights were received at different stages from the members of the ESCWA Publication Committee, led by Mr. Mounir Tabet, Deputy Executive Secretary of ESCWA and Chair of the Committee.

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The Economic and Social Commission for Western Asia (ESCWA) is particularly appreciative of the valuable contributions by national counterparts and national focal points to the preparation of national digital development reviews in the first half of 2019, and the review of chapter 2 of the 2019 Arab Digital Development Report. The names of counterparts, focal point experts and contributing staff members are listed below, sorted by country and partnering institution.

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Executive Summary

The main motivation to produce the Arab Digital Development Report (ADDR) in 2019 is the dire need to promote the linkages between information and communications technologies (ICTs) and the Sustainable Development Goals (SDGs), pinpointing the existing gaps and developing a set of actions that aim at the achievement of these goals, in addition to providing a baseline for future reviews of progress in the overarching digital development process that includes the digital transformation of governments, society and economy, under the main notion of the 2030 Agenda.

Based on consultations with member countries and partnering organizations, the Economic and Social Commission for Western Asia (ESCWA) decided, in 2018, to assess, through this report and possible similar future reports, the status of digital technologies in the Arab region and how they are being harnessed to accelerate the realization of the 2030 Agenda for Sustainable Development in the Arab region.

The process leading to the ADDR 2019 started with an official invite from ESCWA to member countries for collaboration on producing the ADDR through conducting national digital development reviews (NDDRs) for individual Arab countries. A template was designed by ESCWA to guide national focal points and experts in conducting the national reviews and collecting data and information regarding digital development, which was structured in five groups that represent an amalgamation of the

action lines adopted at the World Summit on Information Technology (WSIS) into a more sustainable development-oriented set of clusters, namely:

- Digital strategic frameworks;
- Infrastructure, governance and legal environment;
- Digital economy, employment and trade;
- Digital transformation and social inclusion;
- Culture and media.

In the NDDRs, each of these areas of digital technologies, activities undertaken by stakeholders in each of the participating countries, progress made, and obstacles encountered are presented.

The ADDR 2019 presents an analytic digest of the national reviews and gauges the progress made in the main areas of digital technologies in the Arab region. This is followed by a situational analysis of efforts exerted, challenges faced, and policy reforms undertaken in the Arab region in digital development through the implementation of WSIS outcomes. Linkage with SDGs 4, 8, 9, 10, 13, 16, and 17 are the focus of this report since they constitute the main goals focusing on technology, infrastructure and innovation for sustainable development. Furthermore, the voluntary national reviews (VNRs) on SDGs for Arab countries conducted in 2017 and 2018 provided case studies to concretize the linkage between WSIS action lines and the above SDGs.²

As indicated in the preamble, since the United Nations Economic and Social Council's (ECOSOC) High-level Political Forum (HLPF) of 2019 focused on empowering people and ensuring inclusiveness and equality, the developmental lens selected for ADDR 2019 is one that focuses on empowerment and inclusion. This is an extra step, performed after conducting the NDDRs, based on certain indicators to provide a distilled view on the HLPF theme.

Main findings of the report

In the Arab region, the following behaviour trends of Internet users were noted: (a) mobile telephony is on the rise, particularly using 3G and 4G mobiles; (b) the gender gap in the use of the Internet is much smaller in the Gulf Cooperation Council countries than in other Arab countries, where it is above the average gender gap in developing countries; (c) social media applications are most used on the Internet, particularly voice/video calling apps; (d) e-commerce applications have a less-than-average usage in the Arab region, and e-government and financial services an even lower usage; and (e) affordability of the Internet is rather low in most Arab countries.

A review of the information society status in the Arab region, based on the 10 NDDRs that were prepared by participating countries,³ followed by a comparative analysis of the collected information for each of the five clusters of WSIS action lines, led to the main findings summarized below.

Cluster 1 on digital strategic frameworks:

All participating countries have some form of sectoral ICT strategy, including

e-government strategies and at least one e-health/e-education/e-commerce/e-payment strategy, but not necessarily a long-term vision. Few countries have action plans for broadband, cybersecurity, smart mobility, or artificial intelligence. There are a number of national initiatives aimed at achieving WSIS action lines and empowering the society as a whole by including women, youth and the disabled in building the information society. However, measurements of the digital divide, including the gender gap, are still limited in most of these countries. At the regional and international levels, the countries of the Gulf Cooperation Council (GCC) show more coordination and collaboration than the other countries.

Cluster 2 on infrastructure, governance and legal environment-related policy areas:

Telecommunications regulatory authorities in all Arab countries provide licensing for basic telecommunication services, mobile telephony companies and Internet service providers (ISPs), the latter two becoming fully competitive in practically all participating countries. Mobile phone penetration in all countries continues to grow, with penetration rates between 70 and 200 per cent. Internet access from households is nearing 100 per cent in GCC countries and between 45 and 80 per cent in most of the others. Coverage of population by mobile services is high, at 80 to 100 per cent, for most countries. Fixed-broadband subscriptions are for medium and high speeds in GCC countries and Jordan, and lower speeds in the other countries. Countries suffering from conflicts are focusing on rebuilding digital networks enabling universal access to ICTs, with broadband connectivity, using optical fibre connections. National backbones provide broadband network infrastructure, including

WiFi hotspots, WiMAX services, 3G/4G mobile networks and Internet exchange centres, with links to submarine cables.

A variety of partnerships exist among stakeholders to cover key areas of the information society, particularly in ICT capacity-building, entrepreneurship and infrastructure development. Between 2008 and 2018, participating countries enacted important cyberspace legislations, including e-transactions, e-signature, e-payment, and e-commerce. They developed a cybersecurity strategy and/or official cybersecurity standards, issued cybercrime laws and established specific units to fight abusive activities.

Cluster 3 on digital economy and economic development-related policy areas: In participating countries, telecommunications firms are generally few, Government-owned and with high revenues and number of employees, while information technology (IT) companies are small in size, count in the hundreds and are mostly private. Data on the IT companies are lacking, particularly on their structure, revenues, employees, and gender segregation. ICT research, development and innovation (RDI) strategies are absent as well as mechanisms/tools for implementation. Funds to encourage small- and medium-sized projects through incubators by young entrepreneurs and in special economic zones are limited. ICT-sector (essentially telecommunications) contribution to the gross domestic product (GDP) of participating countries varies between 0.6 and 6 per cent, based mainly on telecommunications revenues. While e-banking, e-commerce and e-business are flourishing in GCC countries, this is not the case in other Arab countries that are struggling to get e-commerce practised by companies and

citizens on a larger scale. Loss of jobs due to increased automation may be partially offset by new jobs for youth in digital technologies. Various forms of e-employment are practised in the participating countries, particularly through employment portals and social networks, by posting curricula vitae (CVs) and work announcements. However, teleworking is very limited in spite of its importance for women and the disabled.

Cluster 4 on digital transformation and social development-related policy areas:

Although community access centres are available in some remote and disadvantaged areas to enhance inclusiveness by facilitating the use of the Internet and providing training, they do not cover the entire area of the countries. Broadband access from home and smartphones are not affordable for low-income families. Few virtual universities have been established to facilitate studies using online technologies, delivering knowledge to students in an interactive manner and preparing modern learning curricula. Adult literacy centres or schools are common, including some dedicated to girls, with computer labs for use in teaching. A number of participating countries have introduced IT as a subject in their school curricula and digitized textbooks to facilitate e-learning. Few initiatives, some of which dedicated to women, have been launched to increase digital literacy. E-government services are expanding in the region, GCC countries being more advanced than most of the others, with e-payment and e-procurement lacking in half of the participating Arab countries. A specific authority is in charge of e-government in each country, providing a portal with static information in all countries, and interactive services/e-payment in several countries. The ministries of health of all participating countries provide on their

websites awareness-raising information about public-health issues for men, women and children, including sexual and reproductive health. Hospital management systems are quite common, however, with limited linkages between hospitals and health centres. Telemedicine for the purpose of diagnosis and remote health care in disadvantaged areas is not common. However, ICT tools, including early warning systems, are used for tracking and monitoring cases of communicable diseases to limit their spreading.

Cluster 5 on culture and media policy

areas: The Arab region possess a rich cultural heritage and digitization of historical documents, manuscripts and museum artefacts is being carried out in most participating countries. Centres of historical documentation have been established, and two- or three-dimensional documentation of historical buildings, produced by using high-quality digital photography as well as sound heritage, are being built using e-platforms and websites to preserve the information and promote cultural activities. However, given the high cost of all these systems, many countries are slow in building them and may altogether stop their development in times of crisis or economic difficulty. The media landscape in the Arab region is diverse with governmental control in some countries and complete independence in others. While traditional media are still important and trusted by citizens, digital media increased the sources of information and its variety, lessened governmental control and provided two-way communications. It should be noted though that, wherever gender-disaggregated data are available, men still dominate the leadership in media companies. The worldwide convergence of ICT with various forms of media (Internet, television, radio and newspapers) led Arab countries to prepare for

this convergence, albeit not at the same accelerated rate as in developed countries. All Arab countries agree that social media have changed the way people live, think and work in the region, sometimes for the better and sometimes for the worse. Raising awareness of positive and negative aspects of social media is essential for their balanced and healthy use.

Inclusiveness in building the information society:

The Economist Intelligence Unit (EIU) Inclusive Internet Index for the year 2019, based on availability, affordability, relevance, and readiness indices, was computed for 100 countries (including 11 Arab countries with five GCC countries). At the Arab regional level, Qatar ranks first, but ranks 37th out of 100 at the international level, with a score of 75.5 out of 100, followed by the other four GCC countries. The Sudan ranks last at the regional level and 90th at the international level with a score of 44.8 out of 100, while Tunisia and Morocco made it to the 10 top countries in the lower-middle income bracket. Most Arab countries have a gender gap varying between 3 per cent (for Qatar) and 53 per cent (for the Sudan).

Empowerment through digital

development: Measuring empowerment seen through the data-for-development lens requires indicators for availability, usage and affordability of data, in addition to a measure for digitization. Availability of 3G is relatively high in most Arab countries, while Internet availability is low for the majority of these countries. Affordability of downloaded data is extremely low and constitutes a huge obstacle for the least-developed countries in the Arab region. Low affordability of data download for countries in a state of conflict inhibits empowerment. In the Arab region, the Digital Adoption Index (DAI) that measures the expansion of digital technologies in a country

is highest for the United Arab Emirates (0.823), with GCC countries generally scoring well (above 0.65), while least-developed countries and those in a state of conflict scored quite low (below 0.34). Hence, the GCC countries are well empowered for using ICT for development, while the others need to boost ICT adoption.

The ADDR includes a separate annex that presents 14 case studies from different Arab

countries on initiatives that were geared towards harnessing ICTs for inclusiveness and/or empowerment.

The ADDR concludes by a chapter presenting thorough recommendations for the digital future of the Arab region, classified into complementary categories of policy actions, and geared towards different stakeholder groups.

Contents

	<i>Page</i>
Preface	iii
ESCWA Publication Team	v
Acknowledgements	vii
Executive Summary	ix
Abbreviations and Acronyms	xviii
Introduction	1
1. Recent Shifts in Digital Technology Trends and User Behaviour at the International and Regional Levels	5
A. Digital technology transformation trends	7
B. Shifts in usage at the international level	9
C. Shifts in usage at the regional level	13
2. Review of Information Society Status in the Arab Region, 2018-2019	21
Cluster 1: Digital Strategic Frameworks	25
A. National digital strategies	25
B. WSIS in the Arab region	28
C. Other international and regional frameworks	31
D. Towards enhancing digital strategic frameworks – related policies	33
Cluster 2: Infrastructure, Governance and Legal Environment	35
A. ICT infrastructure	35
B. Governance	43
C. Legal environment, ethics and trust building	46
D. Towards enhancing infrastructure, governance and legal environment – related policies	57
Cluster 3: Digital Economy and Economic Development	59
A. Strengthening the ICT sector as the supply side of digital economy	59
B. General impact of the ICT sector on the economy	66
C. Towards enhancing digital economy and economic development – related policies	75
Cluster 4: Digital Transformation and Social Development	77
A. Digital transformation, inclusiveness and empowerment	77
B. Capacity-building in ICT for development and digital development	83
C. E-government, e-services and e-health	89
D. Towards enhancing digital transformation and social development – related policies	103

Cluster 5: Culture and Media	105
A. Cultural identity and linguistic diversity	105
B. Media policy	107
C. Towards enhancing culture and media – related policies	118
3. The Arab Information Society through a Developmental Lens	119
A. Digital technologies and sustainable development in the world	121
B. Inclusiveness in building the information society in the Arab region	122
C. Empowerment through digital development	127
4. Recommendations	133
A. Recommendations to Governments	135
B. Recommendations to the private sector	138
C. Recommendations to academia and NGOs	139
Annexes	143
Annex 1. Selected Digital Technology Projects Geared towards SDGs in the Arab Region	143
Annex 2. WSIS Action Lines	154
Annex 3. The 2030 Agenda Sustainable Development Goals	156
Bibliography	159
Endnotes	163
List of Tables	
Table 1. Matrix linking the WSIS 11 action lines with the 17 Sustainable Development Goals	3
Table 2. Internet usage at global level, 2019	10
Table 3. Mobile usage trends	10
Table 4. Social media usage, 2019	11
Table 5. Social media user profile by age group	12
Table 6. E-commerce purchases and spending, 2018	12
Table 7. ICT connectivity in the world, developing countries and Arab States, 2019	14
Table 8. Individuals using the Internet in the Arab region, by gender	15
Table 9. Digital gender gaps in different regions of the world, 2019	15
Table 10. Youth versus total population Internet users by region/grouping, 2017	16
Table 11. Behaviour of Internet users in the Arab world	17
Table 12. Internet use and connection in the Arab region	18
Table 13. Online spending shift in behaviour in the last two years	19
Table 14. Digital policies, strategies and plans in the participating countries	26
Table 15. Telecommunication infrastructure and regulation	36
Table 16. ICT infrastructure, by type	38
Table 17. Registrars and domain-name managers	42
Table 18. Cyberlegislation in Arab countries	47
Table 19. Cyberlegislation in Arab countries: PKI management and cybercrime	47
Table 20. E-business laws and services	68
Table 21. E-government entities and services	91
Table 22. Features of e-government strategies	95
Table 23. Services available on e-government portals	96
Table 24. Services available on e-government portals	97

Table 25.	Services available on e-government portals	98
Table 26.	Media outlets, by category	109
Table 27.	Media outlets, by category	110
Table 28.	Inclusive Internet Index, 2019	123
Table 29.	Availability of access to the Internet, including usage, quality, infrastructure, and electricity	124
Table 30.	Affordability of access to the Internet, including price and competitive environment	125
Table 31.	Relevance, including local and relevant content	125
Table 32.	Readiness, including literacy, trust and safety, and policy	126
Table 33.	Availability, affordability and usage of data	129

List of Figures

Figure 1.	ESCWA Digital Development Framework	24
Figure 2.	GEMS Maturity Index Framework	100
Figure 3.	Digital Adoption Index in Arab countries, 2016	131

List of Boxes

Box 1.	Definitions of digital transformation trends	7
Box 2.	Efforts of the International Telecommunication Union to enhance confidence and security in the use of ICTs	53
Box 3.	The ITU-UNESCO Regional Digital Inclusion Week for Arab States	82
Box 4.	Promoting open educational resources in the Arab States	88

Abbreviations and Acronyms

3G	third generation of wireless mobile telecommunications technology
4G	fourth generation of wireless mobile telecommunications technology
ADDR	Arab Digital Development Report
ADSL	Asymmetric Digital Subscriber Line
aeCERT	United Arab Emirates Computer Emergency Response Team
AHLF	Arab High-level Forum on the WSIS and 2030 Agenda for Sustainable Development
AIGLE	Academy of ICT Essentials for Government Leaders in the ESCWA Region
ALECSO	Arab League Educational, Cultural and Scientific Organization
AR	augmented reality
ASYCUDA	Automated System for Customs Data
ATM	automated teller machine
BI	business intelligence
CAIT	Central Agency for Information Technology
ccTLD	country code Top-Level Domain
CDMA	Code-Division Multiple Access
CIRT	Computer Incident Response Team
CITRA	Communications and Information Technology Regulatory Authority
CMC	Communications and Media Commission
CV	curriculum vitae
DAI	Digital Adoption Index
DHIS	District Health Information System
DSL	digital subscriber line

EADS	Employment Authorization Document
ECOSOC	Economic and Social Council
EIU	Economist Intelligence Unit
EMC	Electronic and Mobile Commerce
eMISK	Environmental Monitoring Information System of Kuwait
EPA	Environment Public Authority
ESCWA	Economic and Social Commission for Western Asia
EWARS	Early Warning, Alert and Response System
FEDL	First Electronic Defence Line
FEDnet	Federal Network
FTTH	fibre to the home
G2B	government to business
G2C	government to citizen
G2G	government to government
GB	gigabyte
Gbps	gigabits per second
GBI	ground-based interceptor
GCC	Gulf Cooperation Council
GCI	Global Cybersecurity Index
GDP	gross domestic product
GEMS	Government Electronic and Mobile Services
GIS	Geographic Information System
GMPC	Gateway Mobile Positioning Centre
GMSA	Global Mobile Suppliers Association
HIS	Health Information System
HLPF	High-level Political Forum

IAPH	International Association of Ports and Harbors
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	information and communications technology
ICT-CFT	ICT Competency Framework for Teachers
IG	Internet governance
IMPACT	International Multilateral Partnership against Cyberthreat
IoT	Internet of things
IP	Internet protocol
IPTV	Internet protocol television
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
ISC	Information Security Centre
ISP	Internet service provider
IT	information technology
ITA	Information Technology Authority
ITU	International Telecommunication Union
LDC	least developed country
MAG	Multi-stakeholder Advisory Group
Mbps	megabits per second
MBRSG	Mohammed bin Rashid School of Government
MCIT	Ministry of Communications and Information Technology
MDG	Millennium Development Goal
MENOG	Middle East Network Operations Group
MiSK	Mohammed bin Salman bin Abdulaziz Foundation
MOCD	Ministry of Community Development
MoCT	Ministry of Communications and Technology

MOHAP	Ministry of Health and Prevention
MOOC	massive open online course
MSP	multisectoral partnership
MTIT	Ministry of Telecommunications and Information Technology
NBC	National Broadcasting Corporation
NCS	national cybersecurity
NCSS	national Cybersecurity strategy
NDDR	National Digital Development Review
NGO	non-governmental organization
NRAA	National Records and Archives Authority
OCERT	Oman National Computer Emergency Readiness Team
OER	open educational resource
PACI	Public Authority for Civil Information
PART	Public Authority for Radio and Television
PKI	public key infrastructure
PoA	plan of action
PPP	public-private partnership
QSTP	Qatar Science and Technology Park
RDI	research, development and innovation
RIPE NCC	<i>Réseaux IP Européens</i> Network Coordination Centre
RSS	really simple syndication
SDG	Sustainable Development Goal
SIM	subscriber identity module
SME	small and medium-sized enterprise
STEM	science, technology, engineering, and mathematics
STM	Synchronous Transport Module

Tbps	terabits per second
TRA	Telecommunication Regulatory Authority
TRC	Telecommunication Regulatory Commission
TVU	TeleVision Unit
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
URL	uniform resource locator
VR	virtual reality
WHO	World Health Organization
WiMAX	Worldwide Interoperability for Microwave Access
WIPO	World Intellectual Property Organization
WSIS	World Summit on the Information Society
WTO	World Trade Organization

Introduction

The 2030 Agenda for Sustainable Development was adopted by the United Nations General Assembly on 25 September 2015.⁴ All United Nations member countries reaffirmed their commitment to achieving its objectives and utilizing it to transform the world for the better by 2030. It includes the 17 Sustainable Development Goals (SDGs) and 169 targets to be attained by 2030, covering areas of critical importance for humanity and the planet.

Also in 2015, the United Nations General Assembly renewed the mandate of the World Summit on the Information Society (WSIS) until 2025,⁵ and called for its close alignment with the sustainable development processes,^{6,7} as information and communications technologies (ICTs) are cross-cutting and constitute means to implement the SDGs and alleviate poverty. The 2016 WSIS Forum focused on supporting the implementation of the SDGs through the implementation of its action lines. The Economic and Social Commission for Western Asia (ESCWA), as one of the United Nations regional commissions, and through its mandate and role within the WSIS process, received a similar extension and hence continues to play a leading role in the WSIS process and linkages with SDGs processes.

At the global level, the High-level Political Forum (HLPF) on Sustainable Development is the central platform of the United Nations for follow-up and review of the 2030 Agenda for Sustainable Development and the SDGs.

It provides for the full and effective participation of all members States of the United Nations and specialized agencies. HLPF carries out regular voluntary reviews of the 2030 Agenda which include developed and developing countries as well as relevant United Nations entities and other stakeholders. The reviews are State-led, involving ministerial and other relevant high-level participants, and provide a platform for partnerships, with the participation of relevant stakeholders.

Knowing the great potential of technology to help deliver the SDGs, the United Nations Secretary-General launched a strategy on new technologies with the aim “to define how the United Nations system will support the use of these technologies to accelerate the achievement of the 2030 Sustainable Development Agenda”.⁸

At the regional level and in line with the global process, ESCWA launched, in 2017, the Arab High-level Forum (AHLF) on WSIS and the 2030 Agenda for Sustainable Development (Beirut, 8-12 May 2017) that focused on the linkages between the WSIS action lines and the 2030 Agenda and resulted in the Beirut Consensus on “Transformation and Digital Economy in the Arab Region: Towards the Achievement of the 2030 Agenda for Sustainable Development”.⁹ The Forum serves as a regional platform for the exchange of experiences and lessons learned, and for building partnerships in the area of technology for sustainable development.

The Second Arab High-level Forum on WSIS and the 2030 Agenda for Sustainable Development was held in Beirut, 19-21 March 2019, bringing together various stakeholders in the information society, digital economy and Internet governance in the Arab region. It reviewed and discussed the linkages of the information society and sustainable development as well as Internet governance issues and priorities for the Arab region with a particular focus on the theme of the global 2019 High-level Political Forum (HLPF) on Sustainable Development, namely empowerment and inclusiveness. It focused on how digital economies and smart societies can accelerate the implementation of WSIS action lines, themes and priority areas, contributing to the achievement of the SDGs in the Arab region.

The 2019 HLPF meeting convened under the auspices of the Economic and Social Council (ECOSOC) in July comprising a three-day ministerial meeting,¹⁰ under the theme “Empowering people and ensuring inclusiveness and equality”, thus focusing on SDGs 4, 8, 10, 13, 16, and 17.

At the regional level, it is worth mentioning that, during the last decade, ESCWA developed a series of seven reports entitled “Regional Profile of the Information Society in the Arab Region”, the last of which was published in 2015.¹¹ In the same context, following the ESCWA study entitled “Arab Horizon 2030: Digital Technologies for Development” (2017),¹² and in line with promoting the linkages between ICTs and SDGs and bridging the gaps with the rest of the world, ESCWA decided, in 2018, to assess the status of digital technologies in the Arab region and how they are harnessed for sustainable development through a series of reports named Arab digital development reports (ADDRs) starting in 2019, based on and

accompanied by national digital development reviews (NDDRs) for individual Arab countries.

These NDDRs are prepared by experts/national focal points nominated by participating Arab countries in collaboration with ESCWA. They are expected to cover the national policies, initiatives, plans, and measurement methods in the area of digital development. A guiding template has been designed by ESCWA to facilitate the development of these national reports, which should provide linkages between WSIS action lines and SDGs, including the yearly e-government survey by the United Nations Department of Economic and Social Affairs (UNDESA).

The primary focus of the ADDRs will be to provide a thorough review of digital technologies in the Arab region in its quest to close rapidly widening gaps before 2030. The secondary focus of the reports will be a developmental lens that is largely derived from the HLPF theme of the intended year of publishing, which was “transformation towards sustainable and resilient societies” for HLPF 2018 and “empowering people and ensuring inclusiveness and equality” for HLPF 2019.

The 2019 ADDR presents the status and progress made in the main areas of digital technologies in the Arab region, with an extended up-to-date situational analysis of main efforts exerted, challenges faced and policy reforms undertaken in the Arab region in the field of digital technologies and digital development through implementation of WSIS outcomes. Linkages to development are discussed with a focus on its main theme, namely “empowerment and inclusion”, touching upon employment, youth and gender aspects while identifying required policy actions.

Table 1. Matrix linking the WSIS 11 action lines with the 17 Sustainable Development Goals

Action lines ^a SDGs ^b	C1	C2	C3	C4	C5	C6	C7 e- gov	C7 e- bus	C7 e- lea	C7 e- hea	C7 e- emp	C7 e- env	C7 e- agr	C7 e- sci	C8	C9	C10	C11
SDG 1	Green	Green	Green	Green	Green	Light	Light	Green	Light	Green	Light	Light	Green	Green	Light	Light	Green	Light
SDG 2	Light	Light	Green	Green	Light	Green	Light	Green	Light	Green	Light	Light	Green	Light	Green	Light	Green	Light
SDG 3	Green	Light	Green	Green	Light	Light	Light	Light	Light	Green	Light	Light	Green	Light	Light	Light	Green	Light
SDG 4	Light	Light	Red	Red	Red	Red	Light	Light	Red	Light	Red	Light	Red	Red	Red	Light	Red	Light
SDG 5	Green	Light	Green	Green	Green	Green	Light	Green	Light	Green	Light	Light	Green	Light	Light	Green	Green	Light
SDG 6	Light	Light	Green	Green	Light	Light	Light	Light	Light	Light	Light	Light	Light	Green	Green	Light	Light	Light
SDG 7	Light	Light	Green	Light	Green	Light	Light	Light	Light	Light	Light	Light	Light	Green	Light	Light	Light	Light
SDG 8	Light	Red	Red	Light	Red	Red	Light	Red	Light	Light	Red	Light	Red	Light	Red	Light	Red	Light
SDG 9	Light	Red	Red	Light	Red	Red	Red	Red	Light	Light	Light	Red	Red	Light	Light	Red	Red	Light
SDG 10	Red	Light	Red	Light	Light	Red	Light	Light	Light	Light	Red	Light	Light	Light	Light	Light	Red	Light
SDG 11	Light	Green	Green	Light	Green	Green	Light	Light	Light	Light	Light	Green	Light	Light	Green	Light	Green	Light
SDG 12	Light	Light	Green	Green	Light	Light	Light	Light	Light	Light	Green	Light	Green	Light	Green	Green	Green	Light
SDG 13	Light	Light	Red	Red	Light	Light	Light	Light	Light	Light	Light	Red	Red	Green	Light	Light	Red	Light
SDG 14	Light	Light	Green	Green	Light	Light	Light	Light	Light	Light	Light	Green	Light	Green	Light	Light	Light	Light
SDG 15	Light	Light	Green	Light	Light	Light	Light	Light	Light	Light	Light	Green	Light	Green	Light	Light	Light	Light
SDG 16	Red	Light	Red	Red	Red	Red	Red	Light	Light	Light	Light	Light	Light	Light	Light	Red	Red	Light
SDG 17	Red	Light	Red	Red	Red	Red	Red	Red	Light	Red	Red	Light	Red	Red	Light	Light	Red	Red

Source: International Telecommunication Union, n.d.a.

^a Action lines: C1- Role of governments; C2- ICT infrastructure; C3- Access; C4- Capacity building; C5- Confidence and security; C6- Enabling environment; C7- ICT applications – e-government, e-employment, e-environment, e-agriculture, e-science, e-business, e-learning, e-health; C8- Cultural diversity and identity; C9- Media; C10- Ethical dimensions; and C11- International and regional cooperation. See annex 2 for more information.

^b SDGs simple titles: 1- No poverty; 2- Zero hunger; 3- Good health and well-being; 4- Quality education; 5- Gender equality; 6- Clean water and sanitation; 7- Affordable and clean energy; 8- Decent work and economic growth; 9- Industry, innovation and infrastructure; 10- Reduced inequality; 11- Sustainable cities and communities; 12- Responsible consumption and production; 13- Climate action; 14- Life below water; 15- Life on land; 16- Peace and justice – strong institutions; and 17- Partnerships to achieve the goal. See annex 3 for more information.

These linkages are schematized in the above diagram, namely the WSIS-SDGs Matrix, devised by the International Telecommunication Union (ITU), by intersection points between the 11 WSIS action lines as columns and the 17 SDGs as rows depicted in red (50 intersections), indicating areas related to the SDGs singled out under the HLPF 2019, namely Goals 4, 8, 10, 13, 16, and 17.

It is to be noted that Goals 9 and 17 are the focus of this report as the main SDGs focusing on technology, infrastructure and innovation for sustainable development. Hence, digital technologies constitute key elements in the next industrial revolution that will shape future efforts towards sustainable development and will affect economies and societies in both developed and developing countries.



1. Recent Shifts in Digital Technology Trends and User Behaviour at the International and Regional Levels

A. Digital technology transformation trends

Advancements in digital technologies are shaping the world into a smaller, more connected, space, with both its moral and physical components. These technologies are steadily promoting human welfare by introducing efficiency to every aspect of life, at affordable prices, and to people from almost all the economic classes and social backgrounds. The extent of these technologies is not entirely conceivable at the moment; what is clear, however, is that they have improved the quality of procedural work at governmental, educational and business levels, introducing automation and other time-saving applications. Furthermore, this change is positively

contributing to gender equality, youth inclusion and the demand for ICT jobs.

Accordingly, brand-new business plans and products have emerged on the market, putting these technologies into practice, ensuring transparency and contributing to international growth in the digital economy, which has reached \$11.5 trillion, representing 15.5 per cent of the world's gross domestic product (GDP).¹³ This number is expected to reach 25 per cent in less than a decade.¹⁴ These innovative products have developed thanks to the inclusive and transformative technologies brought to the start-up atmosphere, reducing the traditional rich-poor countries dichotomy, with access to the Internet reaching 15 per cent in the least developed countries.

Box 1. Definitions of digital transformation trends

5G wireless technology

The advanced fifth-generation (5G) infrastructure is a revolution in information and communications technology (ICT). 5G technologies will efficiently enable new secure, dependable, ultrareliable, and delay-critical services to everyone and everything, such as cognitive objects and cyberphysical systems. Full immersive experience and anything as a service are the primary drivers for a global adoption and market uptake of new technology components. 5G capabilities include a new flexible and efficient wireless interface, access schemes, supporting multi-tenant business models (providing support of different network designs for different customer segments or verticals), and using different virtual network slices (tailored system architectures) instantiated over a software-defined or single physical infrastructure.

Advanced analytics

The autonomous or semi-autonomous examination of data or content using sophisticated techniques and tools, typically beyond those of traditional business intelligence (BI), to discover deeper insights, make predictions or generate recommendations. Advanced analytic techniques include data/text mining, machine learning, pattern matching, forecasting, visualization, semantic analysis, sentiment analysis, network and cluster analysis, multivariate statistics, graph analysis, simulation, complex event processing, and neural networks.

Artificial intelligence

The subfield of computer science concerned with understanding the nature of intelligence and constructing computer systems capable of intelligent behaviour.

Artificial intelligence applies advanced analysis and logic-based techniques, including machine learning, to interpret events, support and automate decisions, and take actions.

Big data

The collection, storage and management of huge amounts of digital information.

Big data are high-volume, high-velocity and/or high-variety information assets that demand cost-effective and innovative forms of information processing that enable enhanced insight, decision-making, and process automation.

Blockchain

An expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a network. Each record contains a timestamp and reference links to previous transactions. With this information, anyone with access rights can trace back a transactional event, at any point in its history, belonging to any participant. A blockchain is one architectural design of the broader concept of distributed ledgers.

Connected clouds (cloud computing)

A model for offering computing as a commonly purchased service (that is, a utility) for storing data and providing access to computing resources (for example, programmes) via the Internet, instead of on a local computer.

Internet of things (IoT)

The concept by which Internet or network connectivity, computing capabilities, and collection and exchange of data extend to everyday objects that are not computers.

A network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment.

Machine learning

A branch of artificial intelligence based on the notion that machines (software applications) can learn from examples and can teach themselves how to solve specific problems without being programmed manually.

Advanced machine-learning algorithms are composed of many technologies (such as deep learning, neural networks and natural-language processing) used in unsupervised and supervised learning that operate guided by lessons from existing information.

Virtual and augmented reality

A computer-generated environment that can be interacted with and experienced through ordinary human senses as if the environment were real.

Virtual reality (VR) provides a computer-generated 3D environment that surrounds a user and responds to that individual's actions in a natural way, usually through immersive head-mounted displays and head tracking. Gloves providing hand tracking and haptic (touch sensitive) feedback may be used as well. Room-based systems provide a 3D experience for multiple participants; however, they are more limited in their interaction capabilities.

Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio, and other virtual enhancements integrated with real-world objects. It is this "real world" element that differentiates AR from VR. AR integrates and adds value to the user's interaction with the real world, versus a simulation.

Sources: Soldani, 2017; Gartner, n.d.

Furthermore, digital transformation has altered the way businesses are organized and run. The most important trends of transformative nature, expected to prevail for the coming five to ten years, include 5G mobile; connected clouds; blockchain; big data; data analytics; machine learning; artificial intelligence; virtual and augmented reality; and the Internet of things (IoT).¹⁵

Box 1 provides definitions and explanations of these terms.

B. Shifts in usage at the international level

With a global population of nearly 7.7 billion people at the beginning of 2019, 60 per cent of which live in urban areas, there are more than 5.1 billion users of mobile phones (penetration of 67 per cent, yearly increase of 2 per cent), 4.4 billion Internet users (penetration of 54 per cent, yearly

increase of 9 per cent) and 3.5 billion active users of social media tools (penetration of 45 per cent, yearly increase of 9 per cent), out of which 3.26 billion people use mobile devices (penetration of 42 per cent, yearly increase of 10 per cent).¹⁶

1. Internet use

It took approximately 16 years for Internet users to reach one billion in 2005. However, it was only a matter of six more years for Internet users worldwide to reach 2 billion.¹⁷ Recent studies suggest that the current growth rate of Internet users is one billion users each 2.7 years. However, the increase in Internet user rate should stabilize once all potential Internet users will be online. It is interesting to learn that the daily average time a user spends online exceeds 6.5 hours, a number which is expected to increase further in the near future. With more than 4 billion Internet users in the world, the collective total number of hours spent online exceeds 1.08 billion years online in 2019.

Table 2. Internet usage at global level, 2019

Number of users	4.1 billion
User penetration	53.6 per cent
Internet user gender gap	17 per cent
Yearly increase of user penetration	8.2 per cent
Average time spent online by Internet users, daily	6 hours and 42 min
Proportion of users using voice commands/voice search, monthly	40 per cent
Proportion of users who watch videos online, monthly	92 per cent
Number of people consuming online video content in early 2019	4 billion

Source: ITU, n.d.b; Kemp, 2019.

Based on ITU statistics for 2019, male Internet users outnumber female ones in all regions, and the global gender gap is increasing. See table 2 for a summary of global Internet usage.

The various means of utilizing the Internet are developing at a fast pace. In particular, mobile phone browsing accounts for almost half the time spent on the Internet. The proportion of people using voice commands is also increasing, thus hinting to faster ways to look up results online, as opposed to written commands, and stronger growth in the use of voice technology. It is also important to note that almost all Internet users regularly keep up with the online visual content,¹⁸ challenging all other traditional visual media means, in particular television.

2. Mobile use

As shown in table 3, today, more than two-thirds of the world population use mobile phones, each (unique) user owning more than one mobile subscription, namely an average of 1.73 phones

per person. At present, two-thirds of the mobile phones used in the world are categorized as smartphones and less than one-third as feature phones, which are simpler phones made essentially for telephone conversation. The yearly increase of mobile connection/subscription of 4 per cent means that approximately 354 million new mobile phones are connected each year.

Table 3. Mobile usage trends

Unique users (subscribed to one or more connections)	5.112 billion
Unique user penetration	67 per cent
Increase of users, 2018	100 million
Mobile connections	8.842 billion
Proportion of mobile connections to total population	115 per cent
Mobile connections, increase in 2018	4 per cent
Mobile connections, average per user	1.73
Mobile connections associated with smartphones	5.453 billion
Mobile connections associated with feature phones	2.444 billion
Proportion of smartphone connections	67 per cent
Proportion of feature phone connections	30 per cent
Mobile broadband connections, yearly increase, 2018	16 per cent
Proportion of 4G LTE connections	50 per cent
Mobile data consumption, monthly	20 billion GB
Consumption of smartphone data, monthly average	7 GB

Sources: Ericsson, 2016; Global Mobile Suppliers Association, 2018b.

The yearly increase in broadband connections by approximately 16 per cent and the proportion of 4G LTE connections currently at around 50 per cent hint towards an increase in smartphones and a decrease in feature phones. The data provided by Ericsson for the year 2018, and assessing specific indicators, suggest that 450 million additional smartphones were used in 2018.¹⁹ Close to 2.5 billion feature phones are in use worldwide, and various other connections associated with PCs, tablets, and mobile routers have reached 270 million. The available data on numbers and percentages of users is not gender-disaggregated.

The percentage of mobile connections that can be classed as broadband, namely 3G and above, has increased significantly since early 2018, with a relative year-on-year increase of more than 16 per cent. Almost half of all mobile connections around the world are now 4G LTE, according to reports from the Global Mobile Suppliers Association (GMSA),²⁰ and the number of LTE subscriptions increased by almost 50 per cent in the 12 months before July 2018.

The increase in applications usage contributed to a significant increase in the amount of consumed data using mobile phones. Ericsson's Mobility Report²¹ shows that the world now consumes more than 20 billion gigabytes (GB) of mobile data each month, while the company's visualizer tool²² indicates that the average smartphone device now consumes nearly 7 GB of data every month and the world consumes over 20 billion GB of data every month over mobile phones.

3. Social media use

As indicated in table 4, the huge number of social media users and yearly increase in

penetration indicate that these platforms have exceeded their typical entertainment/social roles and are now a means of communication for work, with more than 800 million people using social media for work today. Again, the available data on numbers and percentages of users is not gender-disaggregated. It is also worth noting that users have an average of nine accounts on social media platforms, which they do not necessarily use daily. This indicates that no single existing social media platform is satisfactory and that different application functionalities are needed.

Table 5 shows that the social media audience comes from all ages, but mainly from 25-34-year-olds. Gender imbalance exists but is insignificant for people above 45 years of age. This can be explained by the fact that Internet access for women in developing countries is still low, which needs to be remediated since social networks will constitute an important resource for inclusion, particularly education, employment and empowerment of youth and women.

Table 4. Social media usage, 2019

Number of active social media users	3.5 billion
Social media user penetration	45 per cent
Social media users, yearly increase of penetration	9 per cent
People using social media for work	> 800 million
Social media accounts of an average user	9 per cent
Social media users on mobile devices	3.3 billion
Social media users on mobile devices penetration	42 per cent
Users of mobile devices, yearly increase of penetration	10 per cent

Source: Kemp, 2019.

Table 5. Social media user profile by age group (Percentage)

Age groups	Total per age group	Women	Men
13-17	7	3	4
18-24	27	11	16
25-34	32	13	19
35-44	16	7	9
45-54	10	5	5
55-64	6	3	3
65+	4	2	2
Total	102	44	58

Source: Kemp, 2019.

Note: The total is not 100 due to rounding of figures.

Social media penetration rankings for 2019 of countries in the Arab region identified the United Arab Emirates and Qatar sharing top position. In the case of these two countries, the individual platform figures reported actually exceed the total population figures published by the United Nations. This is likely because both countries have significant expat communities that are not included in official local population figures. Public institutions in the United Arab Emirates have social media accounts and guidelines for use, and periodically respond to feedback of people by incorporating changes to existing policies, services and content.

4. E-commerce use

Table 6 demonstrates how e-commerce is globally thriving due to yearly increases in the number of purchases (\$2.818 billion) as well as personal spending (\$634 per purchaser), the latter marking a yearly increase of 14 per cent. "Travel and accommodation" tops the list of e-commerce categories regarding spending, followed by "fashion and beauty" and "electronics and physical media". In 2018,

the amount spent on consumer goods alone topped \$1.78 trillion. Again, gender-disaggregated data on numbers and user percentages is not available here.

Even such developing countries as India have high e-commerce penetration rates, with 74 per cent of Internet users having purchased goods online in the month preceding the data collection date. Given India's huge population and limited online population (less than 40 per cent), hundreds of millions of people can still potentially join the e-commerce community.²³

Table 6. E-commerce purchases and spending, 2018

Number of online purchasers of goods	1.8 billion
Yearly increase of purchasers	3 per cent
Value of e-commerce consumer goods	\$1.786 trillion
Yearly increase of e-commerce spending	14 per cent
Annual revenue of e-commerce per purchaser	\$634
Increase in annual revenue of e-commerce per purchaser	11 per cent
Annual spending on consumer e-commerce by category	In billion \$
• Fashion and beauty	524.9
• Electronics and physical media	392.6
• Food and personal care	209.5
• Furniture and appliances	272.5
• Toys, DIY and hobbies	386.2
• Travel and accommodation bookings	750.7
• Digital music	12.05
• Video games	70.56

Source: Statista, 2019.

5. Conclusion

The main trends emerging globally with respect to shifts in user behaviour are the following:

- Great acceleration in Internet use due to populations in developing countries entering the cyberworld in high numbers;
- Acceleration in the use of mobile phones, particularly smartphones with focus on access to the Internet using 3G and 4G/LTE technology;
- Considerable increase in voice and video facilities on the Internet due to lower levels of literacy in developing countries and facilities provided by social media applications;
- Increase in social media usage not only to cover the social needs of individuals, but also of small businesses, leading to a boom and competition in the social media industry worldwide;
- Increase in e-commerce, including e-marketing, which is becoming a must for companies seeking success through the Internet.

C. Shifts in usage at the regional level

Currently, the population of the Arab region surpasses 420 million,²⁴ and is estimated to reach 440 million by 2020. However, these (mostly) estimated figures differ from one source to another, official population numbers on which ITU based its penetration ratios being generally lower, which results in penetration

rates that are higher than reality. It should be noted that there are differences in the indicators on which the study is based regarding shifts in user behaviour at the global level and those used in the Arab regional study given below. This creates situations in which comparison between global and regional levels is impossible; when these indicators are compatible, however, comparison is made.

1. Connectivity and affordability

According to ITU (table 7), the penetration of fixed telephone subscriptions is decreasing in the Arab region, dropping to 8.8 per cent in 2019, which is below the world average of 12.1 per cent, while mobile telephone subscriptions are increasing, reaching 100.6 per cent in 2019, a trend that is expected to slow down once saturation is reached. This slowing trend of fixed telephony subscription indicates that telecommunication connectivity is becoming predominantly mobile. The penetration of fixed-broadband subscriptions is quite low, at 8.1 per cent (but increasing), compared to a world average of 14.9 per cent; active mobile-broadband subscriptions are at approximately 67.3 per cent, well below the world average of 83.0 per cent. Internet penetration in the Arab region in 2019 was 51.6 per 100 inhabitants, which is slightly lower than the world average of 53.6. Gender-disaggregated data on ICT connectivity is not available at the global level; however, ITU data for 2019 include data on Internet use segregated by gender, with a gender gap of 17 per cent at the global level and 24.4 per cent in the Arab region.

Table 7. ICT connectivity in the world, developing countries and Arab States, 2019 (*Per 100 inhabitants*)

ICT connectivity per 100 inhabitants	World	Developing countries	Arab States
Mobile-cellular telephone subscriptions	108.0	103.8	100.6
Individuals using the Internet	53.6	47.0	51.6
Fixed-telephone subscriptions (landlines)	12.1	7.4	8.8
Active mobile-broadband subscriptions	83.0	75.2	67.3
Fixed broadband subscriptions (ADSL)	14.9	11.2	8.1

Source: ITU, 2019a.

Regarding Internet cost and quality, almost 75 per cent of Internet users in the Arab region find that accessing the Internet in their country is expensive, only 21 per cent find it affordable. Likewise, the majority of Internet users surveyed indicated that the speed or bandwidth and coverage is low or very low. Nine per cent of Internet users find the Internet restrictive on content and services, while 29 per cent consider it totally open.²⁵

2. Gender-disaggregated Internet users

Table 8 provides information on the use of Internet in the Arab region by gender, based on the 2019 ITU Gender ICT statistics, showing that the percentage of men using the Internet is higher than the percentage of women in most of these countries. Bahrain, Kuwait, Qatar, and the United Arab Emirates have the highest percentages of Internet users (more than 98 per cent), with similar percentages of men and women users. The Sudan has the lowest percentage of Internet users (14.1 per cent), followed by Egypt, Algeria, Tunisia, the State

of Palestine, and Morocco. The difference between the number of male and female Internet users is still high in most of the Arab countries, to the advantage of men. Reducing illiteracy and increasing the level of education, especially tertiary education, play an important role in reducing the gender gap in Internet use.²⁶

According to the 2019 ITU Facts and Figures, the global gender gap in Internet use exists in all regions, the gap being large in developing countries, especially in least developed countries (LDCs). The global gender gap has increased with the fast increase of the gap in developing countries. Between 2013 and 2019, the digital gender gap has grown in the Arab region, Asia and Pacific and Africa. Table 9 provides the digital gender gaps in the various regions of the world, showing that the gap in the Arab region in 2019 was 24.4 per cent, which is well above the world average digital gender gap of 17.0 per cent, and slightly higher than the average gender gap for developing countries of 22.8 per cent.

Table 8. Individuals using the Internet in the Arab region, by gender (*Percentage*)

Economy name	Latest year	All individuals	Men	Women
Algeria	2018	59.6	68.1	50.3
Bahrain	2018	98.6	98.7	98.5
Egypt	2018	46.9	52.4	41.3
Iraq	2018	75.0	98.3	51.2
Kuwait	2018	99.6	99.5	99.8
Morocco	2018	64.8	68.5	61.1
Oman	2016	76.8	79.4	74.0
State of Palestine	2018	64.4	68.5	60.2
Qatar	2018	99.7	99.5	99.8
Saudi Arabia	2018	93.3	94.6	91.4
Sudan	2016	14.1	16.9	11.0
Tunisia	2018	64.2	...	...
United Arab Emirates	2018	98.5	97.1	98.8

Source: ITU, n.d.

Table 9. Digital gender gaps in different regions of the world, 2019 (*Percentage*)

Region/grouping	Men users	Women users	Digital Gender gap ^a
Africa	33.8	22.6	33.0
Arab States	58.5	44.2	24.4
Asia-Pacific	54.6	41.3	24.4
Europe	84.9	80.3	5.3
World	58.3	48.4	17.0
Developed countries	87.6	86.0	2.3
Developing countries	52.8	40.7	22.8
LDCs	24.4	13.9	42.8

Source: ITU, 2019a.

Note: The digital gender gap represents the difference between the Internet user penetration rates for men and women relative to the Internet user penetration rate for men, expressed as a percentage.

^a Estimates.

Table 10. Youth versus total population Internet users by region/grouping, 2017 (*Percentage*)

Region/grouping	Prop. of total population using the Internet	Prop. of youth using the Internet	Youth in population	Prop of Internet users aged 15-24
Africa	21.8	40.3	20.1	37.3
Arab States	43.7	64.2	17.9	26.3
Asia-Pacific	43.9	72.3	15.7	25.8
Europe	79.6	95.7	11.5	13.8
World	48.2	70.6	15.9	23.4
Developed countries	81.0	94.3	11.2	13.0
Developing countries	41.3	67.3	16.8	27.6
LDCs	17.3	30.3	20.3	35.1

Source: ITU, 2017.

Note: Proportions in this table refer to the number of people aged 15-24 using the Internet, as a percentage of the total population using the Internet, and the number of people aged 15-24, as a percentage of the total population, respectively.

3. Young Internet users

The latest available data on the use of Internet by youth goes back to the 2017 ITU Facts and Figures, which shows (table 10) that more than 70.6 per cent of youth (aged 15-24) worldwide are using the Internet, which is significantly higher than the proportion of the total population using the Internet (48.2 per cent).

In 2017, in Arab countries, almost 64.2 per cent of the youth are Internet users, compared to only 43.7 per cent of the entire population. Even though youth constitute only 17.9 per cent of the total population, 26.3 per cent of Internet users in the Arab region are young people aged 15-24. This proves that young people are more active on the Internet than today's adult population. Similarly, worldwide, youth constitute approximately one quarter of Internet users, while they constitute only 15.9 per cent of the world population.

4. Online usage behavioural shift

In 2017, a regional survey was carried out by the Mohammed bin Rashid School of Government (MBRSG) in the Arab region examining online usage trends, perceptions and concerns around a new breed of digital transformations in the Arab region.²⁷ Essentially, the use of the Internet is expanding as more time is spent online and contact with people is increasing. The main features of the behaviour shifts of Internet users in the Arab world can be inferred from table 11 and are as follows:

- **Socializing:** Mainly through social networks, Internet users fulfil social needs such as communicating with friends, families and colleagues, among others. This feature is the most quoted by respondents to the survey (92 per cent);
- **News:** News consumptions is the second most popular activity online in the Arab region with 79 per cent of respondents indicating that they consume news online regularly;

- Job search and work: Around 77 per cent of Internet users go online to look for a job, pursue career-oriented goals and update their CVs, and nearly the same percentage of Internet users goes online for work-related issues;
- Entertainment: While 72 per cent of respondents use the Internet for entertainment such as watching/downloading television programmes and movies and listening to music/radio, only 26 per cent use the Internet regularly to play games;
- Education and research: Nearly 68 per cent of Internet users carry out educational and research activities;
- E-commerce: Nearly 40 per cent of respondents indicated that they perform online shopping and retail activities regularly;
- Government services: Only about one third of respondents use online government services regularly;
- Financial transactions: As few as 24 per cent of respondents carry out personal financial transactions online regularly, with a similar percentage for business-related transactions including trading, selling or buying.

It should be noted that gender-disaggregated data on numbers and percentages of users are not available regarding the behaviour of Internet users in the Arab world.

Table 11. Behaviour of Internet users in the Arab world

Percentage of respondents who ...	Percentage
... <u>increased</u> their time online	69
... <u>decreased</u> their time online	12
... <u>kept the same</u> time online	16
... are interacting with <u>more people</u> online	66
... are interacting with <u>less people</u> online	13
... are interacting with the <u>same number</u> of people online	17
... <u>increased</u> their online news consumption	63
... <u>decreased</u> their online news consumption	12
... <u>have not changed</u> their online news consumption	21
... <u>increased</u> their online interactions with governments	41
... <u>decreased</u> their online interactions with governments	11
... <u>have not changed</u> their online interactions with governments	30
... use the Internet for <u>socializing</u> on a monthly basis	92
... <u>consume news</u> on monthly basis	79
... use the Internet for <u>career-oriented goals</u> on a monthly basis	77
... <u>consume music, video and multimedia</u> online on a monthly basis	72
... use the Internet for <u>work</u> activities on a monthly basis	76
... use the Internet for <u>gaming</u> on a monthly basis	26
... perform <u>educational</u> activities on a monthly basis	68
... use online <u>government</u> services on a monthly basis	33

Source: Salem, 2017a.

Table 12. Internet use and connection in the Arab region (*Percentage*)

Internet users spending two or more hours daily online on their Internet-connected phones	>70
Internet users spending two or more hours daily online on their computers	47
Internet users spending more than 10 hours daily online through their phones	17
Proportion of Internet users consuming music, videos and multimedia online, monthly	72

Source: Salem, 2017a.

More than 70 per cent of Internet users in the Arab region spend at least two hours every day using the Internet, while 17 per cent, spend 10 hours or more, mainly consuming music and videos (table 12).²⁸ Less than half of them spend two hours or more every day online using a computer. Hence, the smartphone has become the preferred device to access the Internet for the large majority of Arab users, surpassing desktop or laptop computers in terms of time spent online per day. Out of all Internet users in the region, 58 per cent prefer to browse or consume content in Arabic, while 32 per cent prefer English, and 9 per cent prefer French.

It should be noted that gender-disaggregated data on percentages of users spending time on the Internet is not available.

With the increase in Internet bandwidth in the region and worldwide, communicating using video and voice calls, for personal and work uses, has become practical and popular, especially for youth. Approximately 84 per cent of Internet users in the region rely on voice/video calling apps. WhatsApp tops the list of popular voice calling apps among users in the region (82 per cent), followed by Facebook Messenger (64 per cent) and Skype (37 per cent).²⁹

Encryption of messaging, including voice and video, seem to be important to the great majority of Internet users in the Arab region (68 per cent). It makes them feel safer, noting that the majority of messaging apps nowadays offer users end-to-end encryption, thus boosting security levels.

5. E-commerce use

E-commerce in the Arab region is still in its infancy. Total monthly online spending in 2017 was approximately \$7.3 billion, equivalent to an average user monthly spending of \$74 per month. Table 13 shows that the number of people who increased their online spending activities is rising, not very significantly however and offset by a decrease in users spending online. Almost half of the respondents did not spend any money online during the years 2015-2017. However, the tendency is to improve shopping and carrying out financial transactions online, since about 40 per cent of respondents shop online at least once a month, and 24 per cent carry out their personal and business transactions online. In the same context, the trend in the Arab region in the field of e-commerce indicates that most of these transactions are conducted through platforms from outside the region.

Table 13. Online spending shift in behaviour in the last two years (*Percentage*)

Percentage of respondents who ...	
... <u>increased</u> their online spending	37
... <u>decreased</u> their online spending	16
... <u>did not change</u> their online spending	28
... <u>did not spend</u> money online two years ago	48
... who <u>still do not spend</u> money online	32
... do <u>online shopping</u> and retail activities at least once a month	40
... perform <u>personal financial transactions</u> online on a monthly basis	24
... perform <u>business-related transactions</u> , such as trading, selling or buying	24

Source: Salem, 2017a.

Studies also show that consumers in the region most likely make their online purchases outside the region. The 2017 Global Online Consumer Report, entitled “The truth about online consumers”,³⁰ published by KPMG, showed that African and Middle Eastern consumers were the most likely to import consumer products bought online (50 per cent of purchases). This is particularly true in the United Arab Emirates, where 58 per cent of online purchases were imported, with 80 per cent coming from Asia, North America and Western Europe.

Gender-disaggregated data on spending and percentages of people for each category of users is not available.

6. Conclusion

Summarizing, the main trends emerging in the Arab region with respect to shifts in user behaviour are the following:

- The use of fixed telephony is stationary and even on the decrease in some Arab countries;
- Fixed broadband subscriptions (ADSL), which are based on fixed telephony, are low even compared to developing countries;
- Mobile telephony is on the rise, including mobiles with 3G and 4G technology;
- Internet use is on the increase, but women use of the Internet is still lower than that of men in most Arab countries, with countries of the Gulf Cooperation Council (GCC) having a much more narrow gap than non-GCC countries;
- The gender gap in the use of the Internet in the Arab region is above world average and even above the average gender gap in developing countries;

- Youth (aged 15-24) in Arab countries are better Internet users than the adult population, pointing to a progressively accelerated increase in the use of the Internet in the Arab region in the near future;
 - The highest use of the Internet is for social media applications followed by news and job search;
 - A very high proportion of Internet users rely on voice/video calling apps, particularly WhatsApp, Facebook Messenger and Skype;
- Access to entertainment on the Internet, particularly downloading music and movies is widely used followed by access to education and research;
 - E-commerce applications are used less than the global average in the Arab region, e-government and financial services even less;
 - Most Internet users in the Arab region spend two hours or more daily using the Internet;
 - Affordability of the Internet is rather low in most Arab countries.

2.

Review of Information Society Status in the Arab Region, 2018-2019





2. Review of Information Society Status in the Arab Region, 2018-2019

As indicated in the introduction, ESCWA requested from member countries to prepare NDDRs that describe the current situation of digital development at the national level, mainly during 2018-2019. A template was prepared by ESCWA to unify the structure of these national reports and guide member countries in their endeavours. These NDDRs also provide linkages between WSIS action lines and SDGs.

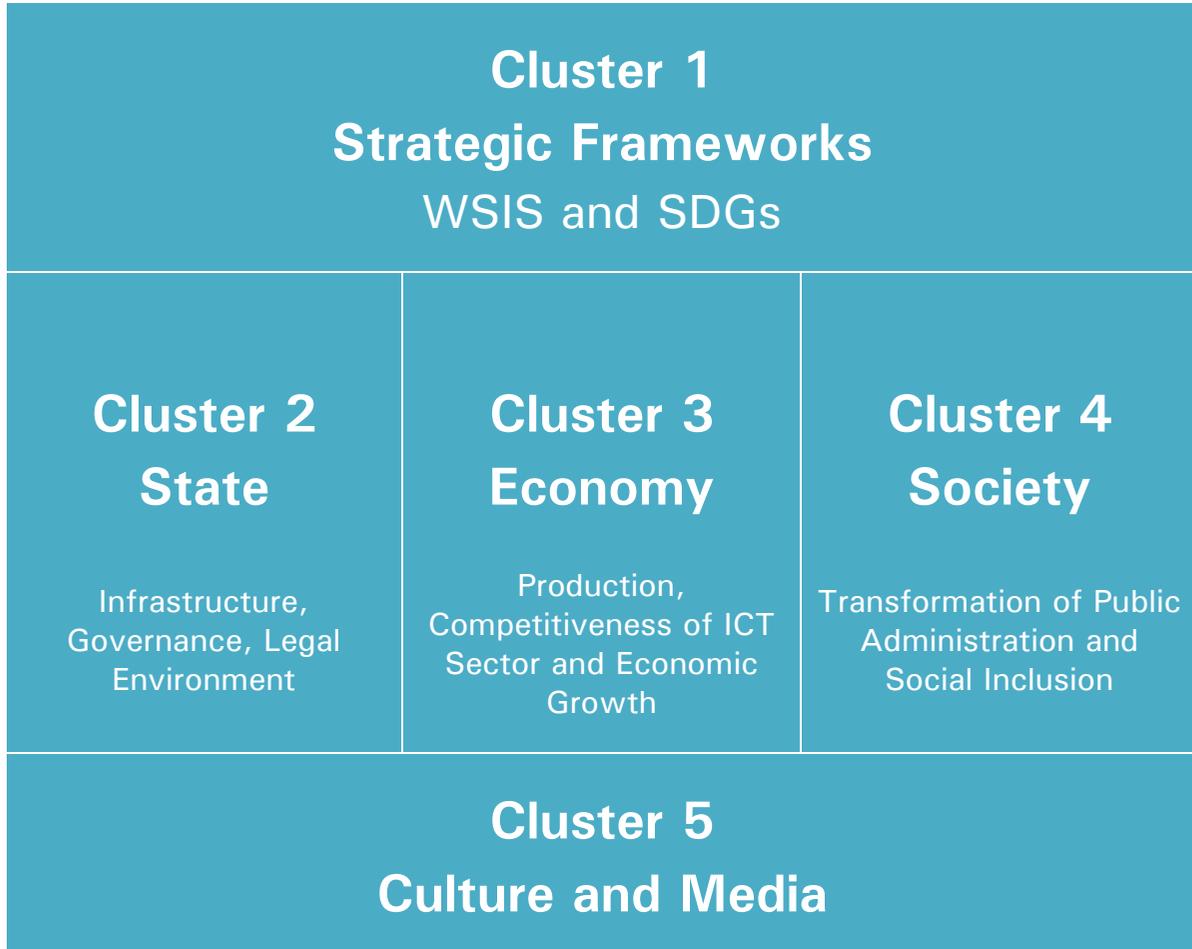
Furthermore, the appendix of the guiding template includes the latest version of the member States questionnaire of the United Nations E-Government Survey, to provide more details about e-government. The member States questionnaire was used by ESCWA in the final draft of this report, and it will ultimately be used for analysis in the upcoming 2020 United Nations E-Government Survey.

Ten ESCWA member countries were able to participate in the NDDR exercise and provide some, or all of the, information requested in the guiding template. Focal points of these Arab countries were invited by ESCWA to workshops to clarify the aims of the NDDR process, discuss the details of the template and stress the need for national multi-sectoral

collaboration in preparing certain sections of these national reports. The ultimate objective of producing this report, namely to provide a regional picture of the current situation and ways to enhance it, were also discussed in these workshops.

This chapter relies on the data collected by national focal points from the 10 participating countries (Iraq, Jordan, Kuwait, Mauritania, Oman, State of Palestine, Sudan, Syrian Arab Republic, Tunisia, and United Arab Emirates), as part of the preparation of NDDRs for 2018-2019 based on the structure of the guiding template. It summarizes their contents, highlights essential information and findings, and analyses the status of digital development in the Arab region. It consists of the following five clusters:

- Cluster 1 on digital strategic frameworks;
- Cluster 2 on infrastructure, governance and legal environment;
- Cluster 3 on digital economy, employment and trade;
- Cluster 4 on digital transformation and social inclusion;
- Cluster 5 on culture and media.

Figure 1. ESCWA Digital Development Framework

Cluster 1: Digital Strategic Frameworks

This cluster directly relates to WSIS action line 1, on the role of governments and all stakeholders in the promotion of ICTs for development, and action line 11, on international and regional cooperation (annex 1 includes the topics covered by the WSIS action lines).

A. National digital strategies

The effective participation of governments and all stakeholders is vital in developing the information society, which requires cooperation and partnerships among all parties involved. Adopting targeted policies and formulating strategies is essential for mobilizing all stakeholders from a cross-section of the public and private sectors and for disseminating the opportunities created by the information society.

Not all Arab countries have overarching digital strategies, but all of them have some form of sectoral ICT strategy, including e-government strategies. Few have e-health, e-education, e-commerce, and e-payment strategies as well as action plans for broadband, cybersecurity, smart mobility or artificial intelligence. Some of these strategies were adopted before 2015, but are being updated. In general, digital strategies and plans are developed by governments with little involvement of all stakeholders, particularly the private sector and non-governmental organizations (NGOs). Table 14 presents a summary of the main digital strategies as indicated in the NDDRs completed by ESCWA member countries participating in this exercise,

in collaboration with, and guidance from, ESCWA.

According to the responses of member countries to the member States questionnaire 2020, and in preparation for the 2020 United Nations E-Government Survey, some countries have specifically targeted emerging technologies within their national digital strategies, covering blockchain, artificial intelligence, big data, and IoT. Examples are provided below.

The Digital Oman 2030 Strategy focused on emerging technologies within the efforts towards digital transformation, including artificial intelligence, blockchain, big data, smart cities, IoT, and virtual reality. The application of emerging technologies covers various sectors, including agriculture, finance, urban planning, education, tourism and entertainment, energy, environment and climate, cybersecurity and privacy, industry and manufacturing, transportation, and health.³¹ Artificial intelligence is also applied in the medical sector in Oman. Furthermore, the Government of Oman established the ICT and the 4th Industrial Revolution Lab to promote economic diversification and identify the applications of emerging technologies in various national projects.

The United Arab Emirates launched the Blockchain Strategy 2021 to transform government transactions, and the Artificial Intelligence Strategy 2031³² to build a new level of innovation and invest in a smart government. The Smart Dubai 2021 plan is put in place to transform Dubai into a smart city, involving various initiatives across six city dimensions.

Table 14. Digital policies, strategies and plans in the participating countries

Country	Overarching digital strategy (<i>Year adopted, updated</i>)	Sectoral (ICT) strategy (<i>Year adopted</i>)	Other strategies or plans (<i>Year adopted</i>)	Supervisory/follow-up agencies
Iraq	Du3M 2025 Initiative (2018)	Telecommunications Policy and Strategic Roadmap (2011)	<ul style="list-style-type: none"> • Strategy and Action Plan for the E-Health Sector (2011); • Strategic axes and programmes for e-government (2016). 	<ul style="list-style-type: none"> • Communications and Media Commission; • Ministry of Communications; • Ministry of Health; • General Secretariat of the Council of Ministers.
Jordan	Jordan Vision 2025 (2015) REACH 2025 (2016)	General Policy for ICT and Postal Sectors (2018)	<ul style="list-style-type: none"> • Digital Jordan Strategy 2018-2022 (2018); • Jordan Economic Growth Plan (2018-2022). 	<ul style="list-style-type: none"> • Ministry of Digital Economy and Entrepreneurship (formerly the Ministry of ICT).
Kuwait	New Kuwait Vision 2035 (2017)	Kuwait ICT Strategy (2019)	Cybersecurity Strategy (2017)	<ul style="list-style-type: none"> • Supreme Council for Planning and Development; • CIT Regulatory Authority; • Central Agency for Information Technology (CAIT).
Mauritania	National Strategy for Broadband (2019-2022) ^a	National Strategy for the Modernization of Administration and ICTs (2012, 2017) Strategy for the ICT sector (2012-2016)	National Strategy for the Development of E-Health in Mauritania 2017-2022 (2017)	<ul style="list-style-type: none"> • Directorate General of ICTs in the Ministry of Higher Education, Scientific Research and Information and Communication Technologies; • Ministry of Health.

Country	Overarching digital strategy (<i>Year adopted, updated</i>)	Sectoral (ICT) strategy (<i>Year adopted</i>)	Other strategies or plans (<i>Year adopted</i>)	Supervisory/follow-up agencies
Oman	Oman 2040, ^b Digital Oman 2030 Strategy – eOman (2003, 2016)	ICT Sector Strategy (2019)	<ul style="list-style-type: none"> • E-Government Transformation Plan (2012); • Broadband Strategy (2013); • E-Commerce Strategy (2019). 	<ul style="list-style-type: none"> • Information Technology Authority (currently Ministry of Technology and Communications); • Ministry of Transport and Communications; • Higher Council of Planning.
State of Palestine		National Information Technology Strategy (2017)	Transition strategy from analogue terrestrial television broadcasting to digital terrestrial television broadcasting (2015)	<ul style="list-style-type: none"> • Ministry of Telecommunication and IT.
Sudan	National Quarter-century Strategy (2007-2031)	Policies for ICT and Post (2014)	<ul style="list-style-type: none"> • Broadband Plan; • E-Payment Strategy; • E-Government and Smart Government Transformation Strategy (2016-2020); • E-Health Strategy (2017-2020). 	<ul style="list-style-type: none"> • National Council for Strategic Planning; • Ministry of Information and CIT; • National Information Centre; • Central Bank of the Sudan.
Syrian Arab Republic	Digital Transformation Strategy 2030 (under development in cooperation with ESCWA)	ICT Strategy for Socioeconomic Development (2004)	National E-Government Strategy (2009)	Ministry of Communications and Technology

Country	Overarching digital strategy (<i>Year adopted, updated</i>)	Sectoral (ICT) strategy (<i>Year adopted</i>)	Other strategies or plans (<i>Year adopted</i>)	Supervisory/follow-up agencies
Tunisia	Digital Tunisia 2020 (2016)	<ul style="list-style-type: none"> • E-Government Cluster (2016); • E-Business Cluster. 	<ul style="list-style-type: none"> • Smart Government Strategy; • Digital Health Strategy; • Smart Mobility Strategy; • Digital School. 	<ul style="list-style-type: none"> • Presidency of Government; • Ministry of Communication Technology and Digital Economy; • Ministry of Health; • Ministry of Transport; • Ministry of Education.
United Arab Emirates	UAE Vision 2021 (2014, 2018)	ICT 2021 Sector Strategy/UAE Smart Government National Plan	<ul style="list-style-type: none"> • UAE Centennial 2071; • UAE Strategy for Artificial Intelligence. 	<ul style="list-style-type: none"> • Prime Minister's Office; • Telecommunication Regulatory Authority; • United Arab Emirates AI Council.

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

^a <http://tic.gov.mr/strategie-de-promotion-du-haut>.

^b <https://www.2040.om/en/>.

B. WSIS in the Arab region

Most Arab countries have been working toward the implementation of the WSIS Plan of Action adopted in Geneva (2003) and the Tunis Agenda (2005) in addition to the United Nations Millennium Development Goals (MDGs) and the follow-up SDGs. Various Arab countries focused on aspects of the Plan of Action that are in line with their digital strategies and specific socioeconomic needs.

National initiatives that were launched by

Arab countries in the context of WSIS and digital development are summarized below. Common initiatives relate to ICT applications such as e-education, e-government and e-health. A number of initiatives integrate inclusiveness for the disabled and people in disadvantaged areas. They also include certain aspects to empower the society as a whole and particularly the disabled, women and youth. However, these initiatives remain insufficient given the increase in populations living in poor neighbourhoods

and disadvantaged areas and the large number of disabled persons, due to conflicts in a number of Arab countries. Few Arab countries focus on measuring the digital divide and various aspects of the information society, in spite of the importance of such measurements in the determining progress.

Iraq, through the adoption of the Du3M 2035 Vision and a related strategy for building the ICT sector with a number of essential objectives and targets matching the WSIS goals, recognized the critical role of ICT as a key enabler for socioeconomic and environmentally sustainable development.

Jordan continuously evaluates and regularly assesses the size of the digital divide, nationally (between cities and rural areas) and internationally (between Jordan and various developed and developing countries) and tracks its national versus regional and global progress in the use of ICTs. Surveys are regularly diffused covering ICT usage and impact and are analysed in various studies published on the website of the Ministry of Digital Economy and Entrepreneurship (formerly the Ministry of ICT).³³ A number of recent regional projects for building the information society and digital economy with local components in Jordan have been launched, including One Million Coders (2019); Digital Opportunity Trust; Jordan's Digital Livelihood Programme (2017); Digital Opportunity Trust Incubators (2019); Start-up Pitch (2019); and Women Economic Empowerment Initiative (2019).

In order to achieve the WSIS outcomes and build the information society and digital economy, Kuwait has established, through the Supreme Council for Planning and Development, the National Knowledge

Economy Centre to be the key cornerstone for digital and knowledge economy transformation plans in Kuwait. The Centre supports the strategic direction of the Vision 2035 of Kuwait towards integrating knowledge and technology to build a national economy that employs innovation and promotes investment, productivity and competitiveness. The Supreme Council for Planning and Development has a section responsible for promoting the e-government programme and provides support and coordination to the Central Agency for Information Technology (CAIT), which is implementing the spatial infrastructure for Geographical Information Systems (GIS). A number of WSIS success stories were designed to promote the information society at the regional and sub-regional levels and include a number of WSIS prize-winning projects between 2013 and 2019.

To achieve WSIS Principles and Agenda, Mauritania adopted, in 2016, Law No. 006 entitled Guiding Law for the Information Society, which defines the Mauritanian information society as a society with a human dimension, comprehensive and safe, working to modernize the State, combat poverty, develop the individual and society, while respecting ethical and cultural values. The National Observatory for ICT was established in Mauritania, aiming primarily at introducing strategic options and following up on the implementation of established strategies, in addition to providing statistics on the information society and ICT performance indicators. In addition, to achieve the internationally agreed development goals, telecommunication operators undertook to develop their networks between 2015 and 2020 to cover 72 local communities and 12 new hub routes.

From the onset, Oman has been committed to work towards achieving the WSIS outcomes,

and to drive the information society initiatives in all walks of life, particularly bridging the digital divide through capacity-building to develop Oman's knowledge society. Between 2012 and 2018, several projects within entities of the Government of Oman won WSIS prizes. They include first prize for access to knowledge and information, in addition to champion for e-health and e-employment applications in 2016.

The State of Palestine has been striving to achieve the Geneva Plan of Action and increase economic development to improve the quality of life of the Palestinian citizens. In this regard, the national ICT strategy is fully consistent with Palestinian international commitments for achieving the SDGs by 2030. In this context, the Ministry of Telecommunications and Information Technology (MTIT) implemented various projects to support start-ups and small enterprises and to provide 3G services in the West Bank and 2G services in the Gaza Strip, thus reducing the digital divide between the State of Palestine and the world, in addition to significant growth in the ICT sector.

In 2016, the Sudan developed a five-year plan (2007-2011) to achieve the goals specified by WSIS in Geneva (2003) and Tunis (2005). The most important challenges facing the plan were the size of the country and the high proportion of rural population. Hence, the cost of access to services was high and the bureaucracy resisted change. The plan also faced the challenge of governance and coordination between different sectors as well as the lack of qualified human resources and the unavailability of regulations and legislations for e-transactions.

In 2004, the Syrian Arab Republic started developing strategies and national plans to support the achievement of the WSIS Action Plan adopted in Geneva (2003), and the Agenda

adopted in Tunis (2005). These strategies and plans have been reflected directly or indirectly in national five-year plans. The main regional projects for building the information society and digital economy with Syrian national components are Arabization of ICT terminology (in partnership with ITU); promoting the digital Arabic content industry through technology incubators (with ESCWA); Academy of ICT Essentials for Government Leaders (with ESCWA); rural knowledge network (with the United Nations Development Programme (UNDP)); "My Family and I" (with the United Nations Population Fund (UNFPA)).³⁴ Some of these projects were terminated earlier than expected due to the war.

Tunisia, as a pivotal country in pursuing WSIS outcomes, from 2005 to 2015, at the national, regional and international levels, has been following up on the implementation of the Plan of Action for the 2025 World Summit, in accordance with resolution 70/125 of 16 December 2015. In the context of transition to information and knowledge societies and to achieve the SDGs, Tunisia has adopted a national strategy called Digital Tunisia 2020, in a participatory framework, in order to reduce the digital divide through the following: improving access to information and knowledge; disseminating digital culture through the use of ICTs in educational curricula and digitizing pedagogic content; developing competitiveness and the digital economy by stimulating investment in ICT; establishing a regulatory framework and good governance; and reducing unemployment by creating digital jobs.

The United Arab Emirates has taken various steps towards supporting the WSIS outcomes, particularly in enhancing the use of ICT for accelerating economic growth, social inclusion and environmental sustainability. The launching

of UAE Centennial 2071, a long-term government plan aimed at setting future generations up for success and prosperity in the five decades ahead, in order to diversify national revenue, relying less on oil and more on digital knowledge-based economy and advanced ICT. Since 2010, the United Arab Emirates has been a trendsetter for the WSIS and will continue to shape its national development strategies based on WSIS action lines and the 2030 Agenda for Sustainable Development. Furthermore, throughout the past half-decade, TRA participated as both a visionary and strategic partner in several WSIS forums.

C. Other international and regional frameworks

Efforts in existing international and regional frameworks in the Arab region has lacked coordination. As a matter of fact, there are very few common international and regional frameworks except those launched by regional organizations, mainly the League of Arab States and ESCWA, such as the Arab Internet Governance Forum process launched in 2012 as part of the Arab Dialogue on Internet Governance.³⁵ In its continuing effort to promote regional integration in the Arab region, ESCWA launched the initiative to gather the e-government programme directors in the region to encourage the exchange of knowledge and information on local, regional and global best practices and new trends in e-government. Specific initiatives for individual countries, which do not constitute strategic frameworks, are often supported by a foreign country or an international company such as Microsoft, Cisco and Oracle. At the sub regional level, the GCC E-Government

Award provides a competitive forum for the six GCC countries focused on e-government projects. Details about international and regional frameworks and initiatives related to digital development, other than WSIS, are given below.

Iraq raised awareness about the Arabic domain names and launched the Arabic country-code top-level domain (ccTLD) “عراق” (meaning Iraq), which was approved by the Internet Corporation for Assigned Names and Numbers (ICANN). Iraq also got the support of ITU, through the issuance by the Plenipotentiary Conference and the World Telecommunication Development Conference, on two resolutions to support Iraq, namely Resolution 51 – Provision of assistance and support to Iraq to rebuild and re-equip its public telecommunication systems; and Resolution 211 – Support for the Iraqi Du3M 2025 initiative for the advancement of telecommunication and IT sectors.

Jordan’s international and regional collaboration is focused on capacity-building and ICT literacy, which are crucial to build an inclusive information society. The e-government programme provides government employees with specialized training on Microsoft, Cisco and Oracle technologies. The ICT Training Academy provides an umbrella for programmes offered by international training academies, universities and local centres to bridge the gap between higher-education institutions and the IT market labour needs. Starting in January 2019, the Jordanian Ministry of Digital Economy and Entrepreneurship (formerly the Ministry of ICT), in cooperation with the World Bank, launched the Start-up Act to develop a legal framework for leading emerging companies to promote entrepreneurship in

Jordan and ensure an enabling environment for investment. In partnership with Good Capital Project and the United Nations Country Team, the 17 Jordan project was launched to provide a collaborative platform and network to leverage partnerships and attract long-term growth capital to SDG-enhancing investments.³⁶ CAIT Kuwait is participating in the GCC Executive E-Government Committee due to the importance of developing e-government projects with full coordination of efforts and developing the Strategy Guide for E-Government in order to achieve mutual goals. The common vision is to strengthen the role of secure e-government in sustainable development and elevate public-sector efficiency and regional integration.

Mauritania initiated accession procedures to the Budapest Convention on Cybercrime and participates in the framework of the Maghreb Interconnection Project, in addition to coordinating the legal ICT framework in this subregion. Mauritania is also a member of the New Partnership for Africa's Development project and participates in all initiatives of the African Union.

The Oman National Computer Emergency Readiness Team (OCERT) has been chosen as the regional centre for cybersecurity for 21 countries across the Arab region in a move that will boost Oman's position in the e-security field. A memorandum of understanding was signed between OCERT (representing the Information Technology Authority (ITA)) and the International Multilateral Partnership against Cyberthreat (IMPACT), the cybersecurity arm of ITU, with key objectives to assist in developing cybersecurity initiatives and encourage research in the cybersecurity field in the region.

Before 2011, prior to the conflict in the country, the Syrian Arab Republic was able to carry out a number of initiatives and projects through regional and international partnerships, including establishing the Syrian-Indian Excellence Centre, specialized in professional ICT training; and hosting the Arab Academy for E-Business founded by the Council of Arab Economic Unity of the League of Arab States.

Tunisia has been selected as a member of the ITU Network of Centres of Excellence for the period 2015-2018 and for hosting two ITU Centre of Excellence nodes for the Arab region. The Tunisian Internet Agency has also been accredited by the ITU as the manager of a root server for the Digital Object Architecture. Tunisia, represented by the City of Kairouan and Bizerte, is conducting a pilot project called ITU Key Performance Indicators for Smart Sustainable Cities, which aims at measuring the intelligence and sustainability levels of the city and determining its positioning with respect to other cities in the world.

The United Arab Emirates has been an ardent supporter of regional collaboration between the GCC and other Arab countries. The country chairs a number of regional groups and committees tasked with preparation towards major ITU conferences, including world radiocommunication conferences, world telecommunication standardization assemblies, world telecommunication development conferences, and plenipotentiary conferences. Moreover, the United Arab Emirates has assisted Arab countries, including LDCs in the region, such as the State of Palestine, Somalia, the Sudan, and Yemen, on matters related to spectrum monitoring, broadcasting regulations and international policy issues, among others, through active cooperation between TRA and ITU.

D. Towards enhancing digital strategic frameworks – related policies

The above information and analyses regarding cluster 1 show that efforts were deployed by Arab countries to formulate and implement digital strategies. However, there is room for enhancements to make the strategic frameworks more effective, as follows:

- Formulating regional and subregional strategies or improve coordination for the benefit of all Arab countries;
- Promoting collaboration among countries towards developing a long-term vision for a country, with a digital strategy and sectoral plans that are well-articulated with the vision and revised periodically;
- Building a partnership between governments, the private sector and other stakeholders, for the formulation of strategies and their implementation, in order to increase the chances of success for digital strategies and plans of action;
- Making the strategies inclusiveness-oriented, conveying the needs of the disabled and people in rural and disadvantaged areas, with a focus on empowerment of the society as a whole and, in particular, women and youth;
- Measuring the digital divide and other aspects of the information society prior to devising strategies and plans, during their implementation and as follow-up, while disaggregating data per gender and age groups.

Cluster 2: Infrastructure, Governance and Legal Environment

This cluster directly relates to the following WSIS action lines: action line 2, on information and communication infrastructure: an essential foundation for an inclusive information society; action line 5, on building confidence and security in the use of ICTs; action line 6, on enabling environment; action line 10, on ethical dimensions of the information society; and action line 11, on international and regional cooperation (annex 1 includes a list of the topics covered by the WSIS action lines).

A. ICT infrastructure

Infrastructure is central in achieving the goal of digital inclusion, enabling universal, sustainable, ubiquitous, and affordable access to ICTs by all. It considers relevant services already in place in developing countries and in countries with economies in transition, to provide sustainable connectivity and access to remote and marginalized areas at national and regional levels.

1. Market structure and regulatory landscape

Most Arab countries have a TRA or commission, focusing on licensing basic voice services, mobile telephony companies and Internet service providers (ISPs). In absence of a regulatory authority, the ministry of ICT takes over.

In general, the basic ICT services are provided by State-owned companies for historical reasons, and these companies own the infrastructure, such as copper and fibre-optic cables and switches. Very few Arab countries have started to privatize the basic telecommunication services and share the network with other companies to create a competitive environment for these basic services. Mobile telephony services have become competitive in the great majority of countries and are still duopolies (with just two companies) in a few countries. ISPs are now fully competitive in all Arab countries. Table 15 provides more details regarding telecommunication infrastructure and regulatory services in all of the participating Arab countries.

2. ICT Infrastructure by service type

Mobile phone penetration in all countries continues to grow, with an average of two mobile phones per person in some GCC countries, such as the United Arab Emirates. Even countries in conflict have penetration rates of at least 70 per cent, probably because of the urgent need to communicate while populations are on the move. Percentage rates of households with Internet access are nearing 100 per cent in GCC countries and between 45 and 80 per cent for most

of the others, which are reasonable or even good. International Internet bandwidth is quite high in GCC countries, particularly the United Arab Emirates, but low in LDCs such as Mauritania and the Sudan, and acceptable to good in other countries. Coverage of population by mobile services is between 80 and 100 per cent for most countries, with the exception of Mauritania, the State of Palestine and the Sudan. The rates of

fixed-broadband subscriptions vary according to the economic situation of the populations, whereby most of these subscriptions are for medium and high speeds in GCC countries and Jordan, while lower speeds are preferred by populations in the other countries. Table 16 provides more details regarding ICT infrastructure by type of service in the selected ESCWA Member Countries (EMCs).

Table 15. Telecommunication infrastructure and regulation

Country	Regulatory authority	Basic ICT services	Mobile telephony	Internet
Iraq	Commission of Media and Communications (CMC)	Information and Telecommunication Public Company (Fibre-optic network, microwave backbone and limited fixed wireless local loop CDMA network)	Zain Iraq, Asiacell and Kork Telecom (competitive)	FastIra, Aljazeera, TigrisNet, Earthlink, Scope Sky, Alsared Fiber, IQ Networks, ITC, Alhayat and Orient (competitive)
Jordan	Ministry of ICT – Telecommunication Regulatory Commission	Jordan Telecom, Orange (landlines, fibre to the home (FTTH)) (competitive)	Zain, Orange, Umniah (competitive)	Orange Internet, Mada VTEL, DAMAMAX, JEIS, Al-Nai, TE-Data, Umniah (competitive)
Kuwait	Communication and Information Technologies Regulatory Authority (CITRA, post-2016) Ministry of Communications (MoC, pre-2016)	Ministry of Communications (DSL, FTTH/business)	Zain, Viva, Ooredoo (competitive)	QualityNet, FastTelco Mada, Zajil B-Online (ex-Gulfnet) KEMS, GulfSat (competitive)

Country	Regulatory authority	Basic ICT services	Mobile telephony	Internet
Mauritania	Regulation Authority	Mattel, Mauritel, Chinguitel (competitive)	Mattel, Mauritel, Chinguitel (competitive)	Mattel, Mauritel, Chinguitel (competitive)
Oman	Telecommunication Regulatory Authority	Omantel (fixed telephone) Ooredoo (fixed wireless telephone)	Mobile network operators: Omantel and Ooredoo Mobile virtual network operators: Freindi and Renna (competitive)	Omantel (ISP) Ooredoo (ISP) Awasm (fixed broadband Internet service (FTTH)) (competitive)
State of Palestine	Ministry of Telecommunication and Information Technology ^a	Palestinian Telecommunications Company (PalTel)	Jawwal, Ooredoo (competitive)	Jawwal (PalTel-Fixed Line) Ooredoo (PalTel-Fixed Line) (competitive)
Sudan	Telecommunication and Post Regulatory Authority	National Telecommunications Corporation Canar Telecom	Zain, MTN, Sudani (competitive)	Canar Telecom, Sodeltel, Nile Valley, MaxNet (competitive)
Syrian Arab Republic	Telecommunications and Post Regulatory Authority	Syrian Telecom	Syriatel, MTN (Duopoly)	28 ISPs (competitive)
Tunisia	National Instance of Telecommunications	Tunisie Telecom	Ooredoo, TT and Orange Tunisie (2G, 3G, 4G), and Lycamobile (competitive)	Six public ISPs, six private ISPs (competitive)
United Arab Emirates	Telecommunications Regulatory Authority (TRA)	Etisalat, Du (Duopoly)	Two operators + one satellite operator offering GMPC ^b services (competitive)	Two ISPs + two satellite operators offering GMPC services (competitive)

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

^a In the State of Palestine, a new law on telecommunications was developed in 2018, in collaboration with ESCWA, and included the establishment of a TRA.

^b GMPC stands for Gateway Mobile Positioning Centre.

Table 16. ICT infrastructure, by type

Country	Mobile phone penetration (Percentage)	Households with Internet access (Percentage)	International Internet bandwidth (Kbps) per Internet user	Population covered by mobile networks (Percentage)		Fixed-broadband subscriptions by speed tiers (Percentage of total fixed-broadband subscriptions)		
				At least 3G	At least LTE/WiMAX	256 Kbps to 2 Mbps	2 to 10 Mbps	10 Mbps or more
Iraq	87.1	58.8	49.8	85.6	0	60	30	10
Jordan	106	82.9	49.9	99	90	5	13	81
Kuwait	172.6	99.7	85.1	99.8	99.6 ^a	14.6	34.1	51.3
Mauritania	92.2	14.3	11.7	42.1	0	57.6	23.8	18.6
Oman	149.8	88.6	74.6	99.0	92.1	1.8	83.5	14.7
State of Palestine	96.6 ^a	58 ^a	34.1	55.0	0	0.4	41.6	58
Sudan	70.7	33.6	2.1	46	35	61	38	1
Syrian Arab Republic	85.7	45	24	82	40	95.88	4.1	0
Tunisia	124.7 ^a	46.1 ^a	52.6 ^a	99	87	0.8	66.8	32.4
United Arab Emirates	210.9	96.9	303.2	100	99.6	5.2	8.2	86.6

Source: ITU, 2018b.

Note: Only data related to the 10 participating countries were included in this table.

^a Value was provided by the national focal point.

3. ICT connectivity

To improve ICT connectivity in the Arab countries, particularly those suffering from war and destruction, a number of projects is being implemented aiming at digital inclusion nationwide, enabling universal, sustainable and ubiquitous access to ICTs by all. This universal access includes households, businesses, government institutions, schools, universities, health

institutions, libraries, post offices, museums, community centres, and other institutions accessible to the public. These projects are different from country to country depending on the need to increase ICT connectivity and available financial resources. However, the expansion and modernization of national communication networks for broadband connectivity, using optical fibre connections, is a common trend.

Iraq places the main focus on increasing the bandwidth of interconnecting links and integrated network operation and management, providing secure and reliable telecommunication services through the following projects: enhancement of the nationwide dense wavelength division multiplexing backbone network; enhancement of the metropolitan dense wavelength division multiplexing network in Baghdad; upgrading of the Internet protocol packet data network; integration and upgrade of the international gateway; expansion of Internet protocol (IP) multimedia subsystem and billing system; and development of a network operation centre.

Jordan focuses on providing a nationwide fibre-optic high-speed network to connect public governmental institutions, particularly education and health-care entities to enhance e-learning, e-health and e-services through the National Broadband Network Programme.

Mauritania is implementing a national strategy to promote broadband and universal access to digital services in order to increase coverage and capacity for all and develop a knowledge-based economy to improve the standard of living of the population. Hence, a high-capacity fibre-optic interministerial network has been built in Nouakchott to provide broadband access, secure messaging services and application hosting. Some schools, municipalities and technical/vocational training centres have been connected, enhancing their access to the Internet and various ICT services.

In Oman, to ensure universal coverage of telecommunication services, three joint initiatives were launched between TRA and operators to provide telecommunication services in rural areas, namely the establishment and installation of 200 mobile

communications stations to cover around 250 villages; construction and installation of 112 mobile communications stations to provide mobile telecommunication services to 160 villages; and imposing obligations on Omantel to provide broadband services to rural areas in 11 sites for mobile telephony and 7 sites for fixed telephony through FTTH technology.

The Syrian Government adopted the principle of universal service at a very early stage, installing voice service in rural areas through nearly 1,700,000 lines in three successive rural projects, through which broadband Internet service packages were provided. A universal service support fund was created in 2016 leading to the implementation of a number of projects, including increasing broadband in rural areas from 25 to 35 per cent; financing the Ministry of Education network, linking all schools to a broadband Internet network, and providing educational services to achieve developmental goals; and financing the Ministry of Health network linking 281 health centres to a broadband Internet network.

Digital Tunisia 2020 aims to strengthen broadband infrastructure in the country through a set of digital infrastructure projects, namely the National Integrated Network of the Administration for providing high-quality communication services and public information systems, and deploying collaborative work applications; the National Integrated Network of Local Authorities (municipalities) linking approximately 900 sites with the same objectives; and the White Area Access Project to cover isolated and unconnected areas. Additional projects include the infrastructure-sharing project through the establishment of wholesale infrastructure operators and the establishment of an access network providing IoT services within the 863-870 MHz band.

The United Arab Emirates TRA recognizes the importance of ensuring that consumers have access to the same minimum set of services, at the same price and regardless of their location, including high-speed data packages of at least 10 Mbps. Additionally, the Federal Network (FEDnet) is being implemented as a high-speed connectivity infrastructure that connects all government entities at the federal and local levels allowing data exchange through a government data bus. Thus, FEDnet increases service availability from the two competing providers and reduces their access price. Moreover, TRA supports an artificial intelligence strategy towards smart cities and the implementation of Internet Protocol Version 6 (IPv6) on FEDnet.

4. Internet architecture

The national Internet landscape varies greatly from one country to another depending on geography, areas to be served, population, economic situation, and other factors. However, the backbone, broadband network infrastructure, availability of Wi-Fi hotspots, WiMAX services and 3G/4G mobile networks are essential components of the architecture as well as fibre-optics network, Internet submarine cables, national and regional Internet exchange centres, and regional root servers. The description of this architecture for the participating countries is given below.

The Internet architecture in Iraq is based on a nationwide optical backbone with mesh (380 Gbps) and ring (200 Gbps) topologies, microwave networks, fibre-optic submarine cables (FLAG 444 STM1, GBI 144 STM1), fibre-optic links to all neighbouring countries, and

Internet services providers (using Wi-Fi, FTTH, DSL and 3G mobile technologies).

In Jordan, the Internet has been functional for more than 20 years, and currently digital subscriber line (DSL), worldwide interoperability for microwave access (WiMAX) and mobile are the most popular platforms. Their capacity combined exceeds one terabit per second (Tbps), with access to multiple submarine cables and terrestrial crossborder connections. Each of the three main operators has at least one international link through submarine cable-fibre links (Falcon and Flag) with full competition resulting in a favourable price for international bandwidth. Jordan also has direct connectivity to Egypt and other neighbouring countries as well as to global locations via the Falcon and Flag links, in addition to fibre link into Saudi Arabia and to the west. The Telecommunication Regulatory Commission (TRC) is currently working in coordination with concerned entities, namely the *Réseaux IP Européens* Network Coordination Centre (RIPE NCC), ICANN, and the Middle East Network Operations Group (MENOG), in addition to ISPs and the private sector to establish a local internet exchange point in Jordan and IPv6 transition.

Kuwait has a robust backbone network infrastructure with adequate capacity distributed across the country, which is fully covered by 4G mobile network services. Several Wi-Fi hotspots are available for use at different locations. FTTH networks currently cover 60 per cent of premises, and 100 per cent coverage is foreseen for 2027. Kuwait has recently launched an Internet exchange point connecting all local service providers and digital businesses. The local root server (.kw) is maintained by CITRA, and the adoption of IPv6 is in the planning phase.

Mauritania developed communications for the Internet by linking most cities using optical fibre cables and submarine cables between 2008 and 2012, through efforts by telecommunication operators to provide broadband connections. A 1,650 km optical fibre cable is being built to connect the remaining cities and to provide broadband during 2019. National and regional Internet exchange centres and regional root servers Wi-Fi hotspots, WiMAX and 3G/4G mobile networks are available now. The adoption of IPv6 is under way.

In Oman, the Internet can be accessed through fixed broadband, including DSL, fixed wireless, FTTH, Internet leased lines, and others. The introduction of WiMAX and Wi-Fi technology offered every citizen easy connection to the Internet through mobile connectivity. An Internet exchange point enables ISPs and operators of core Internet infrastructure to exchange traffic with each other and interconnect, reducing transmission costs and improving performance through greater resilience and robustness. The Omani TRA, in partnership with ITA, which is currently the Ministry of Technology and Communications, has developed a clear and well-defined plan for seamless transition to IPv6 for the continued growth and stability of the Internet, particularly since technologies such as 4G, smart cities and IoT require more and more Internet addresses.

The Palestinian Telecommunications Company Paltel owns the national infrastructure of the Internet in the State of Palestine. Some Internet service providers have their own fibre cables. Private companies also offer wireless Internet access to homes or businesses. As a preparatory phase to transform the city to a smart one, the municipality of Ramallah provided wireless Internet access to the city as well as the municipality of Al-Bireh. Only two

companies, namely Jawwal and Orado, have launched third-generation mobile telephony after a 10-year conflict between the State of Palestine and Israel. Fibre-optic networks are available in the State of Palestine only for private companies, government institutions and some other entities, but not for homes. The State of Palestine is currently in the process of moving to IPv6, and a data centre has been fully equipped for this purpose.

The Internet architecture in the Sudan is based on fibre-optic connections linking it to the neighbouring countries of Chad, Egypt and Ethiopia, submarine cable from Port Sudan to Jeddah, satellites (IntelSat, MidNet, ArabSat), in addition to a national fibre-optic cable (34,000 km long) linking major cities and a national governmental network. IPv6 has been adopted by the National Information Centre in the Sudan, and training is being carried out to implement this new protocol.

The Internet backbone in the Syrian Arab Republic is owned by Syrian Telecom with about 1.5 million access gates. The Ministry of Communications and Technology is carrying out efforts to increase its efficiency, performance and reliability through the adoption of IMS Technology, and moving from time-division multiplexing to IP replacing all existing network equipment gradually over a period of ten years. A pilot optical-fibre data transmission network was launched, with currently 460 subscribers, mostly from the business sector, companies and government institutions. Four submarine cables link the Syrian Arab Republic internationally and regionally with the expansion reaching 400 Gbps in 2017-2018. Other ground cables connect the Syrian Arab Republic with neighbouring countries. The transition plan from Internet Protocol Version 4 (IPv4) to IPv6 is under study.

Table 17. Registrars and domain-name managers

Country	ccTLD registrar(s)	URL of registrar	Number of registered ccTLDs
Iraq	Communications and Media Commission	http://www.cmc.iq	.iq 1082 (2015), 929 (2016), 1113 (2017) عراق.
Jordan	National Information Technology Centre	http://www.nitc.gov.jo	.jo 4738 (2015), 4763 (2016), 4915 (2017)
Kuwait	CITRA, Qualitynet, Fasttelco, Bonline, Mada, KEMS	http://citra.gov.kw Qualitynet.Net FASTtelco Bonline.Net Mada Communication KEMS Internet Service Provider	...
Mauritania	NIC Mauritania	http://www.nic.mr	.mr 1700 (2017)
Oman	Omantel, Ooredoo, Gulf Cyber Tech, Oman Data Park, AGIP Interactive Solutions & Services	http://www.registry.om/oman/en/?page_id=197	.om 3331 (2015), 3397 (2016), 3761 (2017)
State of Palestine	Palestinian National Internet Naming Authority	http://www.pnina.ps	.ps 1755 (2015), 1835 (2016), 1607 (2017) فلسطين.1050
Sudan	Sudan Internet Society	https://www.sdnic.sd	3263 (2015), 3722 (2016), 4104 (2017), 4695 (2018)
Syrian Arab Republic	National Agency for Network Services	http://nans.gov.sy	.sy 1522 (2015), 1683 (2016) 6437 (2017), 10345 (2018) سورية. 110 (2016), 116 (2017), 123 (2018)
Tunisia	Internet Tunisian Agency	http://www.registre.tn	.tn 235 (2015), 255 (2016), 299 (2017) تونس. 316 (total Feb 2019)
United Arab Emirates	23 accredited registrars	https://www.tra.gov.ae/aea/en/accredited-registrars.aspx	.ae 181,400 (2015); 203,200 (2016); 211,600 (2017)

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: "..." indicates having no information.

The Internet architecture in Tunisia is based on a number of optical-fibre cables, some of which are submarine cables, others ground cables. The capacity of the international Internet bandwidth was 430 Gbps by the end of 2018.

The Internet backbone and broadband network of the United Arab Emirates is based on the next generation network, fibre optic, Wi-Fi hotspots, WiMAX services, 3G/4G mobile networks, fibre-optics network, and Internet submarine cables. The country has 13 submarine cable systems landing in various locations on its shores, most of which are controlled by Etisalat Telecommunications Company, and four by the Emirates Integrated Telecommunications Company. The United Arab Emirates has national and regional Internet exchange centres and regional root servers using IPv6, in addition to two Internet exchange centres. One of these centres, DataMena, is carrier-neutral, the other, SmartHub, is not operated in an open manner.

5. Domain-name management

Table 17 provides essential information for domain-name management in each of the participating Arab countries, including the ccTLD registrars, namely uniform resource locators (URLs) and names, and the number of registered ccTLDs for each domain-name. It should be noted that not all Arab countries have acquired a ccTLD in Arabic.

B. Governance

1. Public-private partnerships, multisectoral partnerships and the role of NGOs

Structured dialogue involving all relevant stakeholders is essential to devise sustainable digital strategies for the

information society and for the exchange of best practices. This dialogue needs to be formalized through partnerships, which could be public-private partnerships (PPPs), multisectoral partnerships (MSPs) and other mechanisms, at the national, regional or international levels. Countries of the region have developed a variety of partnerships to cover key areas of the information society, such as digital strategy development, ICT capacity-building, entrepreneurship, industrialization, software standardization, infrastructure development, telecommunication services, digital services, and smart cities. It should be noted that NGOs are involved in these partnerships in large numbers as can be seen in the following country summaries.

In Iraq, a large share of ICT services is provided by the private sector, including mobile-phone services, Internet services, capacity-building of ICT staff, and e-learning programmes. Hence, about 40 partnership contracts have been signed between public companies (of the Ministry of Communications) and private companies to set up and manage various projects. NGOs, international and regional organizations collaborate with the government in building the ICT sector. The Korea International Cooperation Agency provides training for government employees on computers and telecommunication using interactive training equipment. The World Bank also enrolled Iraqi universities in the University Governance and Quality Assurance Project, ICT being one of the foundations; and the Japan International Cooperation Agency realized the Communications Network Development Project for Major Cities.

In Jordan, three committees led by the Minister of ICT have been formed to promote PPPs and

MSPs, namely the ICT Advocate Committee, the Entrepreneurship Committee and the E-Government Committee, as advisory committees to develop Jordan's ICT sector, youth employment and entrepreneurship, through a common strategic vision. Members of these committees are from the public and private sectors. Members of the E-Government Committee mainly are from the private sector. NGOs, particularly int@j, are quite active in implementing a number of projects such as the Digital Content Pioneer Initiative and the 1,000 Leadership Initiative.

In Mauritania, the Ministry of Higher Education, Scientific Research and Information and Communication Technologies promotes PPPs and MSPs to exploit the maritime cable in the country, with the public sector accounting for 35 per cent of the funding and the telecommunication operators for 65 per cent. This led to a significant increase of bandwidth and lower prices for the Internet and international communications.

In Oman, Ooredoo signed an agreement with the Ministry of Endowment and Religious Affairs to apply artificial intelligence technologies to big data and IoT. A cooperation and partnership agreement was signed by the Ministry of Education and Omantel in December 2018 to provide support for the School Olympiad to encourage junior talents in IT. A smart city platform was launched in February 2017, with the aim of providing awareness, sharing knowledge, networking, and collaborating to apply smart city solutions in Oman. This was the result of an MSP between the Supreme Council for Planning, ITA (currently the Ministry of Technology and Communications), the Muscat Municipality and the Research Council.

The Palestinian ICT Strategy 2017-2022 is the fruit of a PPP between MTIT, academia, ISPs, mobile telephony and landline operators, and the Palestinian Information Technology Association. MTIT also participates in a number of projects to develop smart cities and their services in cooperation with universities and municipalities.

The Syrian Arab Republic launched a number of joint ventures as PPPs in the ICT field, namely a Syrian-Korean company between Syrian Telecom and Samsung Electronics Korea; a Syrian-German company between Syrian Telecom and GTC Germany for the production of wireless access equipment; and TASDID Payment Services, a joint venture between Syrian Telecom and a local private partner. The war adversely affected the work of these companies, leading to the dissolution of the Syrian-Korean Company and limiting the activities of the Syrian-German Company to the maintenance of existing devices. The introduction of mobile operators into the Syrian market was also carried out in form of a partnership between Syrian Telecom and two private mobile operators in the form of a build-operate-transfer agreement until 2015, when a shift to work under licences was granted to them.

In Tunisia, a key example of PPP in digital strategy governance is the Strategic Digital Council chaired by the president of the government, which provides effective governance through the involvement of the private sector and civil society. The General Public-private-partnership Authority³⁷ was established as a decision and validation body of the PPP institutional framework specialized in PPP contracts under the supervision of the presidency of the government.

In the United Arab Emirates, many stakeholders from the private sector are extensively involved in the achievement of the Vision 2021 and are part of the executive team. The TRA Digital Services Marketplace is an initiative that aims to enable government entities to realize their initiatives through standard cloud services provided by the private sector. The platform links buyers from government entities with sellers offering tested and proven solutions. Multiple initiatives are taking place involving public-sector players along with private partnerships, including initiatives such as the Fintech hub by the Abu Dhabi Global Market and the Government Service Bus by TRA.

2. Internet governance

The participation of Arab countries in Internet governance (IG) activities is mainly focused on attending the global IG Forum, the Arab IG Forum and some ICANN meetings and conferences. Among the participating Arab countries, very few countries have a national IG Forum, Tunisia being one of them. Some Arab countries collaborated with ICANN to obtain ccTLDs in the Arabic language. The following provides a summary of IG activities in the Arab region.

Delegations from Iraq participated in Internet Governance Forum activities to build knowledge and skills in this domain and to follow global trends, develop regulatory frameworks, apply good practices, and avoid potential risks.

Jordan's TRC is currently working in coordination with related entities (namely RIPE NCC, ICANN, MENOG, ISPs, and mobile network operators) and with all stakeholders towards the establishment of a national local Internet exchange point in Jordan, in addition to a safe transition to IPv6.

Mauritania participates regularly in Internet governance activities such as workshops held in cooperation with ICANN and regional and international conferences.

Oman's ITA (currently the Ministry of Technology and Communications) has actively participated in the global IG Forum since 2006. Recently, Oman has passed the string evaluation process of ICANN, which is required to launch the internationalized domain names in the Arabic language.

In the State of Palestine, there is an ongoing dialogue between stakeholders including the executive authority, telecommunication companies, banks, and the private sector to reach a national IG policy. Awareness leaflets are distributed, and workshops held to communicate the objectives of the global and regional IG Forum. Participation in the Arab Forum for Internet Governance has been useful since there is no locally organized national governance forum.

In the Sudan, regular dialogue is held among all partners in the area of IG, forming a committee of all stakeholders in 2015, identifying initiatives or mechanisms for a national IG forum. The Sudan participated in all activities related to the global IG Forum and Arab IG Forum activities and is a member of the Arab Multi-stakeholder Advisory Group (MAG). The Sudanese Internet Association is a permanent member of ICANN and of more than five different committees.

The Syrian Arab Republic chaired the Arab Group for Domain Names, subsequently called the Arab Group for Domain Names and Internet Affairs, since its establishment in 2005 until 2012. It made effective contributions to the work of the team, including the launching of domain names in Arabic, and the evaluation of the test developed by ICANN. It also contributed to the

launch of the .arab top-level domain and was one of the first countries to register a country top-level domain in Arabic, namely “سورية.” launched in 2016. Prior to the war, the country made several contributions to ICANN and participated in IGFs and related high-level forums, renewing its participation in the global IG Forum in 2017.

The Tunisian IG Forum started in 2013, with a group of experts supervising its activities in the various fields related to the Internet, known as MAG, which is composed of three members of State administration, civil society, university and technical communities, and of private sector, each.

The United Arab Emirates does not have a formal structured dialogue between stakeholders on IG subjects. Nevertheless, there are consultations between the government and various private stakeholders on many subjects that involve Internet regulation, including ICT businesses, ISPs, end users, Information Security Operations Centre chapters, and domain-name players. This includes, among others, policies regarding trust services, Internet infrastructure, cloud computing, IoT, and domain names. TRA participates in the Arab IG Forum and operates social-media accounts that have hundreds of thousands of followers and use social-media influencers.

C. Legal environment, ethics and trust building

The provision of an enabling environment is crucial to mobilize resources and create a climate conducive to the acquisition and

dissemination of ICT. Moreover, a trustworthy, transparent and non-discriminatory legal, regulatory and policy environment constitutes an essential basis for cooperation between public and private sectors. The sensitivity and value of digital information and the need to protect it are increasing. This section on legal environment, ethics and trust building tackles specific requirements related to security and privacy, protection of personal data and confidentiality of information.

1. Legal and regulatory environment

The most important legislations for the cyberspace and its regulatory environment are those related to e-transactions, e-signature, e-payment, and e-commerce, in addition to the availability of public key infrastructure (PKI) management. Table 18 and table 19 provides a summary of the main cyberlaws issued in participating Arab countries. Most of these laws were adopted between 2008 and 2018. Only Iraq, the State of Palestine and the Sudan are lacking certain laws covering, among others, e-signature, e-payment and e-commerce. More details are provided for each country following the two tables below.

In Iraq, several laws provide the ICT sector with needed regulation, including the Ministry of Communication and Information Technology law, the Media and Communication Commission law, the communications and information law, and the investment law (Law No. 13 of 2006). The e-signature and e-transactions law was issued in Iraq as Law No. 78 of 2012. E-commerce and e-payment seem to be gaining grounds with the Iraqi society.

Table 18. Cyberlegislation in Arab countries

Country	E-transactions	E-signature	E-payment	E-commerce
Iraq	Law 78/2012	Law 78/2012	n/a	n/a
Jordan	E-Transaction Act 15/2015	By-laws 86/2016 and 11/2014	By-Law 111/2017	E-Transaction Act 15/2015
Kuwait	Law 20/2014	Law 20/2014	Law 20/2014	Law 20/2014
Mauritania	Law 022/2018	Law 022/2018	Law 022/2018	Law 022/2018
Oman	Decree 69/2008	Decree 69/2008	Decree 69/2008	Decree 69/2008
State of Palestine	Act 15/2017	Draft	Act 17/2000	n/a
Sudan	E-Transactions Acts 2007, 2015	Regulations emanating from the E-Transactions Act 2017	Regulations emanating from the E-Transactions Act	Regulations emanating from the E-Transactions Act
Syrian Arab Republic	Law 3/2014	Law 4/2009	Law 3/2014	Law 3/2014
Tunisia	Decree 2639/2008	Law 83/2000, Decree 1667/2001	Law 51/2005	Law 83/2000
United Arab Emirates	Federal Law No. 1 of 2006 on E- Commerce and E-Transactions	Federal Law No. 1 of 2006 on E- Commerce and E-Transactions	Regulatory Framework for Stored Values and Electronic Payment Systems	Federal Law No. 1 of 2006 on E- Commerce and E-Transactions

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Table 19. Cyberlegislation in Arab countries: PKI management and cybercrime

Country	PKI management	Cybercrime
Iraq	Available	Available ^a
Jordan	Available, 2016	Law 27/2015
Kuwait	Available, 2014	Information Technology Crimes law 63/2015
Mauritania	Instructions on e- certification, 2006	Law 007/2016
Oman	Available, 2016	Decree 12/2011 and its amendment, Law 45 of 2015
State of Palestine	Within e-Transactions Act	Law 10/2018
Sudan		Cybercrime Act, 2007 (amended in 2018)
Syrian Arab Republic	Law 4/2009, National Authority for Network Services	Decree 17/2012 on Cybercrimes and Law 9/2018 to establish special courts for cybercrime cases

Country	PKI management	Cybercrime
Tunisia	Available, 2000	In 2015, organic Law 2015-26 of 7 August 2015 was added to fight against terrorism and the repression of money laundering
United Arab Emirates	Ministerial Resolution No. 1, 2008, regarding the issuance of certification and service provider regulations	Cybercrime Federal Decree Law 5, 2012, on Combating Cybercrimes, and its amendment, Federal Decree Law 12, 2016

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

^a The ICT strategy includes laws and legislations for cyberspace crimes in accordance with international agreements and conventions.

In Jordan, Telecommunications Law No. 13 of 1995 was issued to regulate the sector when the telecommunication market was privatized and more than one player entered the market. It was subject to amendments, the last of which was in 2011, to include IT in the law and reconnect the board of commissioners with the ICT minister. The E-Transactions Act (Law No. 15 of 2015) aimed to enhance e-services and e-commerce transactions by clarifying the legal framework for doing business online, including contracting. The e-transactions law was complemented in 2017 with directives on the exchange of data between government entities. TRC was given the authority to license and accredit bodies for e-authentication and to regulate their work. By-laws for licensing and e-authentication were issued in 2014 (No. 11/2014) and amended in 2016 (No. 86/2016), and a by-law for e-procurement (No. 1/2018) was issued. Other laws include regulations of e-payment and e-transfer, in addition to audiovisual and media law and cybercrime law. In 2018, the rights-of-way legislative system and over-the-top system were prepared in collaboration with ESCWA.

Legislation in Kuwait includes laws on IT crimes (Law 63/2015)³⁸ I and e-transactions (Law 20/2014).³⁹ Policies regarding best practices in cybersecurity are currently under development

by CITRA and will be tailored to the specific needs of the State in both the private sector (ISP, telecommunications, and others) and public entities. A law on intellectual property rights was adopted in 2016 (Law 22/2016).⁴⁰ Policies regarding data privacy will be developed as part of the national cybersecurity strategy (NCSS) (2017-2020).⁴¹

The legal and regulatory framework in Mauritania has developed considerably and now includes appropriate foundations for investment and sustainable development in the information society and a transparent and appropriate environment for competition. Other laws include the cybercrime law No. 007 of 2016. Mauritania is a member of the World Intellectual Property Organization (WIPO), the World Trade Organization (WTO), the Paris Convention for the Protection of Industrial Property, and the Patent Cooperation Treaty.

In Oman, the legal and regulatory framework provides a trustworthy, transparent and non-discriminatory environment for the cooperation between public and private sectors. Policies are in place to ensure protection of sensitive digital information and personal data. Oman is a member of WTO, WIPO, the Berne Convention, the Paris Convention for the

Protection of Industrial Property, the Madrid Protocol, and the Patent Cooperation Treaty. The Telecommunications Regulatory Act was issued in March 2002 under Royal Decree No. 30/2002. Other laws include the E-Transactions Law No. 69 of 2008, the Cyber Crime Law of the Sultanate of Oman issued by His Majesty's Royal Decree No. 12/2011, and the Data Classification Law No. 118/2011 and its amendment 45/2015, issued to insure information and data security and privacy.

In the State of Palestine, the following cyberlaws have been issued: Law No. 15 of 2017 regarding e-transactions, Law No. 16 of 2017 regarding the protection of personal data,⁴² and the Electronic Crimes Act No. 10 of 2018. An e-signature law has been drafted and is awaiting approval from the Palestinian Government.

The Sudan is building a transparent and non-discriminatory regulatory environment to enhance information security and protect privacy through the following laws: The National Information Centre Law of 2010; the Telecommunications Regulatory Authority Act of 2018; the E-Transactions Act of 2007, amended in 2015; the E-Crimes Law of 2007, amended in 2018; and the Freedom of Information Act of 2015.

The Syrian Arab Republic issued a package of legislations governing the work in cyberspace in the past 10 years, namely: the Law of E-Signature and Network Services (Law No. 4 of 2009), which resulted in the establishment of the National Network Services Authority; the Syrian Telecommunication Law issued by Law No. 18 of 2010, which established the regulator of the telecommunications sector; the Law on the Regulation of Network Communications and Information Crime, Legislative Decree No. 17 of 2012; the Law on the Protection of Copyright and Related Rights, Legislative Decree No. 62 of

2013 (integrated with Patent Law No. 18 of 2012); and the Electronic Transactions Law, Law No. 3 of 2014, which is compatible with the e-signature law and adopts several principles reflected in the permissibility of electronic means in transactions and relations with government departments, e-contracting, e-documents, e-letters, and emails.

The Tunisian telecommunications law is in the process of being updated.⁴³ Intellectual property is governed by Law No. 38 of 2009, relating to the IPR and the national system of standardization, and Decree No. 1083/2011 identifying the categories of norms and modalities of their elaboration and diffusion. Furthermore, there exists Personal Data Protection Law No. 63 of 2004 and e-Procurement Decree No. 1039 of 2014. Access to information and communication networks is considered a right under Article 32 of 2014 of the Tunisian constitution. In addition, a law was passed in 2004/2005 related to information security systems and networks, and a project on e-government was created.

The United Arab Emirates has a number of laws covering cybercrime, e-commerce and e-transactions, and a national digital identity.

2. Privacy and data protection

Privacy and data protection legislation and its implementation need to be strengthened in most Arab countries participating in the ADDR exercise. Except for Tunisia, which started adopting data protection laws in 2004, such legislation has either only recently been adopted or is still being drafted and discussed. The implementation of existing legislation and the establishment of implementation mechanisms are in limbo in most, if not all, countries. More details on each country are provided below.

In Iraq, a committee for the coordination and management of government activities towards the establishment of e-governance was established by Decree No. 45 of 2016. It consists of several teams, one of which focuses on establishing a privacy and data protection policy.

In Jordan, the Personal Data Privacy Protection Law was drafted in September 2018 by the Ministry of ICT. The proposed version still needs to clarify the independence of the privacy commission. With the support of ESCWA, an amended version will undergo a fourth round of public consultation by mid-2019.

In Kuwait, policies regarding data privacy have been developed and are pending approval as part of its NCSS. Currently, CITRA is working on a cloud data classification policy. New regulations shall determine the rules and guidelines to protect the fundamental rights and freedoms of individuals.

In Mauritania, Act No. 020 of 2017 provides protection of personal data. Mauritania participated in the preparation of the African Union Convention on Cybersecurity and Personal Data Protection to ensure greater protection in this area.

In Oman, the Data Classification Law No. 118/2011 was adopted in 2011 and amended in 2015 by Law No. 45/2015 to ensure information and data security. A privacy law is being drafted following public consultations and will be submitted to the Ministry of Legal Affairs for issuance and publication.

The State of Palestine has no specific law for the protection of data privacy; however, a ministerial committee is preparing a bill on the subject. The Electronic Crimes Act includes a

number of articles to protect data privacy of individuals considering certain actions as punishable offences.

The Sudan issued bulletins in the form of brochures showing how to save data and ensure privacy. Discussions are ongoing to educate users about privacy on the Internet and means of protection of personal data. Civil society organizations have carried out numerous activities on this topic in the form of workshops, seminars and specialized sessions for students, youth, lawyers, and others.

The Syrian Arab Republic adopted the 2012 Cybercrime and Information Crime Law, which addresses privacy and the protection of personal data. Policies dealing with privacy and protection of personal data are still dealt with in the context of public information security and under the Law on the Organization of Internet Communications and Cybercrime.

Since 2002, Tunisia has been a forerunner in the field of personal data protection and adopted the Data Privacy Protection Law as early as in 2004. The constitutional consecration in 2014 of the protection of privacy has put this protection at the forefront of rights and freedoms to be guaranteed under the new republic. Tunisia also becomes the 51st State member of Convention 108 of the Council of Europe. In March 2018, the Tunisian Parliament introduced a new draft law on the protection of personal data in accordance with the new European General Data Protection Regulation. Currently, justice is handling more than 80 cases of serious violations of the 2004 law.

The United Arab Emirates has no general federal data protection law comparable to those existing in Europe. The national constitution provides the individual with a general right to

privacy.⁴⁴ However, this right is limited to citizens of the country, which, according to various sources, consist only 8-12 per cent of the total population actually living in the United Arab Emirates. Article 378 of the Penal Code (Federal Law 3 of 1987) provides that the publication of any personal data that relates to an individual's private or family life is an offence.

3. Countering cybercrime, misuse and abuse of ICTs

Cybercrime laws are essential to counter the misuse of ICT and prevent the abuse of technology. Hence, all participating Arab countries have issued respective laws following coordination between ministries of ICT, justice and the interior. Anti-spam legislation is generally included in cybercrime laws, and some of the participating countries seemingly have specific units to fight abusive activities and cybercrimes. Most countries have a computer emergency response team capable to take the necessary actions in case of cyberattack. More details are provided for each country in the following paragraphs.

In Iraq, a draft cybercrime law includes legal penalties for the abuse of computers, electronic devices and computer networks, in accordance with international agreements and conventions. Training centres are requested to organize respective courses and awareness workshops. One division within the Ministry of the Interior is tasked with the prosecution of cybercrimes such as electronic fraud and offensive content.

The Jordan Cybercrime Law was passed in 2012. The criminal activities outlined in this law include illegal access to websites, allowing minors to access pornographic material,

promoting terrorism and prostitution, human trafficking, and accessing information not intended for the public. A special unit specialized in combating electronic crimes was been established within the Public Security Directorate.

The Department of Combating Electronic Crime within the Ministry of the Interior of Kuwait is in charge of combating cybercrime by enforcing Cybercrime Law No. 63 of 2015 and by spreading awareness to the public via social media. CITRA also plays a part in regulating the use of the Internet and fighting spam through its national cybersecurity (NCS) awareness campaign.

Mauritania has a law dealing with cybercrime, namely Act No. 007 of 2016, and national measures are being taken to prevent, detect and prosecute cybercrime and misuse of ICT. Special units were set up to combat cybercrime at the level of the Ministry of the Interior, the Ministry of Information and Communication Technology organized risk-awareness seminars and training workshops, and units to prevent and detect abusive uses of ICTs were established.

The Cyber Crime Law of Oman was issued as Royal Decree No. 12/2011, which is seen as a major milestone in the implementation of the e.oman strategy by the ITA, which is currently the Ministry of Technology and Communications. The Ministry provides awareness and a secure environment for users of electronic devices by offering high-quality security services. Two main divisions expend the Ministry's efforts, namely the Information Security Division, which is responsible for the security of government entities security, and the Oman Computer Emergency Readiness Team⁴⁵ that serves as the regional centre for cybersecurity covering 21 countries in the Arab region in collaboration with ITU.

The State of Palestine established an electronic crimes unit to enforce cyberlegislation; a technical laboratory to investigate and detect electronic crimes; and a Palestinian emergency response team (PalCert) to deal with any emergency in the field of information security, while monitoring networks to reduce attacks at the national level. Publications in the field of information security are produced for awareness-raising and education.

The Sudan adopted the Anti-information Crime Act in 2007, a new version of which was issued in 2017 with the assistance of ESCWA assistance. Specialized laboratories to detect cybercrimes were set up at the Ministry of the Interior and the Ministry of ICT, supervised by a group of specialized engineers. The National Information Security Centre was established to manage information security in government agencies containing a team that responds to computer accidents (SudanCert). To detect and prosecute cybercrime, specialized judicial system, police units and laboratories within the Ministry of the Interior and the Ministry of ICT were set up, respective officers and lawyers trained, and publications in newspapers, television and social media sites launched to educate citizens.

In the Syrian Arab Republic, a number of joint measures were taken involving the Ministry of Communications and Technology (MoCT), the Ministry of Justice and the Ministry of the Interior to reduce and prosecute cybercrime, including the following: developing a training curriculum that includes the concepts of information crime, digital evidence and digital legitimacy, directed to judges, criminal justice police and lawyers; establishing specialized courts for ICT crimes and a specialized branch to combat information crime, in addition to a

specialized laboratory for digital evidence within the Information Crime Branch of the Ministry of the Interior; and issuing a series of leaflets to raise awareness on harmful emails, including a set of guidelines on the abusive use of ICT.

Since the adoption of the organic law to fight terrorism and money laundering in 2015, Tunisia took a number of measures for the prevention, detection and prosecution of cybercrime and the misuse of ICT, including the creation of the Technical Telecommunications Agency to watch over the integrity of networks and protect electronic communications from cybercrimes by hackers and terrorists, and a national platform to prevent such attacks as distributed denial-of-service attacks on websites and mail servers. At the end of October 2019, the Tunisian Government announced the elaboration of the National Strategy for Cybersecurity. This strategy was drafted by the Communications and Information Security Committee emanating from the National Security Council.

In 2008, the United Arab Emirates established the Computer Emergency Response Team (aeCERT) to improve the standards and practices of information security and protect the IT infrastructure in the country against risks and violations, ensuring a safer cyberspace. Additionally, aeCERT plays an important role in awareness-raising and education, allowing the innumerable benefits of IT while protecting Internet users, both individuals and organizations, thus ensuring a promising future for the ICT sector in the country.

One of the main partners of ESCWA in the field of combating cybercrime and promoting cybersecurity is the ITU Arab Office. Box 2 provides information on its efforts in this domain.

Box 2. Efforts of the International Telecommunication Union to enhance confidence and security in the use of ICTs

Information and communications technologies (ICTs) were recognized as pivotal in delivering support for the implementation of the 2030 Sustainable Development Goals (SDGs). However, the increasing access to ICTs alone would not be complete, let alone sustainable, without ensuring an adequate level of confidence in their security, based on which newly connected communities can thrive.

Increasingly, with the Internet of things (IoT), and embedded ICTs everywhere, cyberincidents will have more significant effects on the physical world. Governments must work as multi-stakeholders with the private sector and civil society, among others, and build effective measures to reduce threats and enhance confidence and security in accessing digital services.

The Arab regional initiative on confidence and security in the use of telecommunications and ICTs of the International Telecommunication Union (ITU), identified by Arab States during the World Telecommunication Development Conference (WTDC) in 2017, aims at improving cybersecurity in the Arab region by assisting countries in developing mechanisms such as legal frameworks, national cybersecurity strategies (NCSSs), deployment of capabilities, and sharing of information and knowledge to ensure an adequate level of confidence and security in the digital world. However, a cybersecurity gap still exists, meaning that some Arab countries are still lagging behind and struggling with keeping up with the fast-growing cyberthreats.

Arab regional cyberdrill events organized by the ITU since 2011 have been essential to further promote capacity-development in the area of cybersecurity by supporting member States in developing and implementing operational procedures to better respond to various cyberincidents, identifying possible improvements for future planning and processes and operational procedures of computer incident response teams (CIRTs). In addition, ITU is working with member States and ITU Centres of Excellence to deploy capabilities to build capacity at the national and regional levels to strengthen the position of States in dealing with cyberincidents.

ITU, under its flagship CIRT programme, has conducted 75 CIRT readiness assessments globally, successfully implemented 13 CIRT projects and is in the process of completing the implementation of five additional national CIRT projects by the end of 2019.

ITU is working to support national leaders and policymakers in the development of NCSSs, the establishment of digital forensic labs and raise strategical thinking in matters of cybersecurity, cyberpreparedness and resilience. To this end, ITU published a guide to developing a national strategy aimed at providing an aggregated and harmonized set of principles and good practices on the development, establishment and implementation of NCSSs. To follow up on the application of the guide, ITU conducts regional and national workshops to help countries in the drafting and refinement of their national cybersecurity (NCS) through hands-on exercises.

To sum up ITU activities in building confidence and security in the use of ICTs, especially under the Global Cybersecurity Agenda, the Global Cybersecurity Index (GCI), launched in 2013, has issued three publications since 2015. GCI is an initiative to measure the commitment of countries to cybersecurity through raising cybersecurity awareness.

GCI has become an excellent tool that is used by member States to analyse areas that need improvement, including the NCSS, the national CIRT, legislation, capacity-building, and cooperation. The real value of GCI is to instigate advances at the national level, but, more importantly, to share good practices with countries in need.

Source: Compiled by ESCWA based on information provided by the ITU Arab Office, 2019.

4. Use of electronic transactions and documents

Various e-transactions are carried out in Arab countries using digital identity e-signature based on PKI and digital certification with a central e-authentication/digital certification authority, which issues e-identification cards or subscriber identity module (SIM) cards. Some countries are more active than others in the implementation of and means provided for e-documents and e-authentication. In Tunisia, for instance, the issuance of e-invoices is regulated by the government, and the United Arab Emirates has a novel smartphone-based e-Pass government identification. More details are provided in this section on each of the participating Arab countries.

The Iraqi E-Signature and E-Transactions Law No. 78 of 2012 includes e-transfer of funds as well as encryption of emails, e-signing of files and other e-services such as central authentication.

In Jordan, E-Transactions Law No. 15 of 2015 and By-laws No. 86 of 2016 and No. 11 of 2014 of the Licensing and Accrediting Bodies for Electronic Authentication give the TRC the authority to license and accredit the bodies for e-authentication and regulate their work. The Jordanian PKI was set up in 2016 indicating the roles, policies and procedures needed to create, manage, distribute, use, store, and revoke digital certificates and manage public-key encryption. Digital identity management, including digital signature and multifactor authentication, is under preparation and should be launched in late 2019 or early 2020.

In Kuwait, the Law on E-Transactions No. 20 of 2014⁴⁶ governs e-records, e-signature, e-documents, e-payments, privacy, and data protection. The Public Authority for Civil Information (PACI) is in charge of issuing and regulating PKI. Certificates are issued to the public and stored on their smart civil identification cards. This enables the card holder to digitally sign documents when needed. PACI also provides e-authentication for online services. The Mobile ID Project using biometrics (fingerprint and facial recognition) is in the process of being applied in all government entities for e-services.

As part of the electronic identity card project, Mauritania has established a safe card agency, as part of which most citizens over the age of 18 carry an electronic identity card with a chip containing two electronic certificates: one for identity verification and one for e-transactions.

In Oman, digital certification is a service offered by ITA's National Digital Certification Centre that manages the issuance of digital certification according to the electronic transactions law. The main services of the Centre are digital identity, digital certification, digital stamp, and time stamp, thus allowing citizens and residents to conduct transactions in a high level of confidentiality, trust, credibility, and data protection. In 2017, the Centre recorded 4.3 million online government transactions using digital certification ID cards and 1.2 million online government transactions using mobile PKI.

In the State of Palestine, the Ministry of Telecommunications and Information Technology operates the X-Road data

transfer carrier through the issuance of an authentication certificate, a PKI system to ensure the security of transmitted information.

In the Sudan, a presidential decree was issued establishing the National Authority for Electronic Authentication and approving its law in 2015. The digital signature service was launched through PKI and is now available to all through the Ministry of Communications and Information Technology.

In the Syrian Arab Republic, with the adoption of the E-Transactions Law, a number of pilot projects were adopted to exchange documents signed electronically under certificates of ratification issued by the Centre for Experimental Authentication. These projects include the exchange of documents and circulars between the presidency of the Council of Ministers and the ministries. In 2018, the certification centre granted 250 new certificates.

E-documents are used in the Tunisian Government between ministries and public administration departments. In 2016, Government Decree No. 1066 set the conditions and procedures for issuing and archiving electronic invoices. El-Fatoora © is a service provided by Tunisia TradeNet provides to Tunisian companies to issue their e-invoices.

The United Arab Emirates' Pass app is the first national digital-identity and signature solution that enables users to identify themselves to government service providers in all Emirates through a smartphone-based authentication. It also enables users to sign documents digitally with a high level of security. The new app serves the government's goals in realizing digital transformation and eliminating paper transactions. The Pass digital signature is already used in several such initiatives as

Basher, an integrated e-service enabling investors to establish their businesses in the United Arab Emirates within 15 minutes through a unified online platform, which is connected with federal and local government entities and provides commercial licence services. The initiative saves 10 million waiting hours, 1,011 tons of carbon dioxide and 45,600 working hours, which can be allocated for innovation activities.

5. Online and network security

Practically all participating Arab countries have a security strategy and/or official security standards for online communications and networks. They also have CERTs that carry out their activities effectively through specific measures that may differ from country to country as described in this section.

Online and network security in Iraq is carried out by two types of international gateways, the first for voice and the other for data traffic. The existing gateway for voice was implemented by the Information and Telecommunications Public Company and is being used for international fixed-voice and mobile communications. The gateway for data was implemented by the Al-Salam State Company and is mainly used for Internet services.

The Jordanian Ministry of ICT published its NCSS 2018-2023, providing the vision and prospective programmes to be developed and customized by the regulatory and advisory governmental entity. A special unit was established in the Public Security Directorate which is specialized in combating all electronic crimes, including tracking and detection. Two CERTs were established, one for civil and the other for the military entities.

Kuwait CITRA prepared NCSS to protect national infrastructure and a national CERT strategy. As part of the strategy, CITRA elaborated a three-year plan for an awareness campaign, whose implementation began in 2018 as part of the cybersecurity programme. CITRA has numerous Instagram posts encouraging safe cyberbehaviour online to raise awareness among society of cyberrisks. CITRA will adopt international cybersecurity policies and create its own policies tailored to the needs of the country.

Mauritania's NCSS strategy was developed to cover the following five areas: protecting national information systems; protecting vital infrastructure; developing skills and awareness in security; developing a legal and regulatory framework; and developing PPP and international cooperation. Work is under way to establish a CERT team as included in the strategy, which is scheduled to be operational in 2019. In the meantime, accidents can be reported through a website created for this purpose (www.support.gov.mr) or by telephone.

NCSS Oman includes a roadmap for organizational structure, legal measures, capacity-building, technical and procedural measures, and regional and international cooperation. An important measure was the establishment of OCERT in 2010 to address cybersecurity risks, build local cybersecurity capabilities, and spread cybersecurity awareness among all stakeholders. In 2018, OCERT discovered and handled hundreds of thousands (attempted) attacks and millions of (attempted) malware infections, handled 2,334 real cybersecurity incidents, published 341 security threat notifications and alerts, and handled 140 digital forensics cases with 828 evidence devices.

The State of Palestine does not have a national security strategy, but established an information security management system that contains a set of rules to be met by all institutions to ensure information security and a secure information environment. In 2015, the Palestinian computer emergency response team (PalCERT) was established. It monitors cyberattacks and breakthroughs, detects and handles cyberincidents, provides training on information security, and publishes documents on cyberrisks and ways to avoid them.

The Sudan set up a committee to develop a national strategy for information security at the level of the presidency of the Council of Ministers. An Information Security Coordination Committee was formed, comprising the directors of the National Information Centre, the Telecom and Post Regulatory Authority and the National Authority for Electronic Authentication, in addition to representatives of the Bank of the Sudan, the Ministry of Finance and the Ministry of the Interior.

In the Syrian Arab Republic, MoCT developed a set of information security standards adopted by the presidency of the Council of Ministers. In 2014, the National Agency for Network Services established the National Information Security Policy and Regulations. Mid-2011, the Information Security Centre (ISC) was created to improve information security standards and practices, protect ICT infrastructure from cybercrime threats, build a secure IT environment, and promote awareness of information security at the national level. The Information Security Response Centre is currently being developed within the ISC, including the necessary equipment and applications such as threat-detection sensors and digital forensic analysis and information recovery.

Tunisia is implementing a national security strategy integrated within the national strategy Digital Tunisia 2020 is progressing. A national CERT helps the Internet community make appropriate use of IT to promote high-level training in the various branches of information systems security and to facilitate communication between professionals and experts working in the field. The National Agency for Computer Security provides the general public with national guidelines. The Tunisian Post offers a merchant kit to integrate into e-commerce sites to secure online payment.

In the United Arab Emirates, the First Electronic Defence Line (FEDL) is the forefront defense mechanism for the national federal government entities. Acknowledging that compliance to security standards needs to be uniform across all government entities, TRA used all necessary technical resources to establish one comprehensive solution to the security challenges facing federal government entities. FEDL is considered a critical part of the holistic approach, utilizing the latest cybersecurity protection technologies and tools, linked to aeCERT whose role is important in defining the compliance framework that FEDL implements when it comes to protecting the federal entities. The United Arab Emirates' NCSS aims to secure national information and communications across the country. Furthermore, TRA implemented additional policies to handle the following cybersecurity issues: the National Information Assurance Framework, a critical information infrastructure protection policy, and the national Information Assurance Standards.

D. Towards enhancing infrastructure, governance and legal environment – related policies

The information and analyses in cluster 2 show that, in spite of great conflicts in the Arab region, big strides were made in infrastructure, governance and legislation in most Arab countries, particularly the GCC countries. However, improvements are needed as far as infrastructure, governance and legislative aspects related to cyberspace are concerned, in order to reach more acceptable levels of advancement in digital development, which are the following:

- Provide a competitive environment for basic telecommunications, including fixed telephony and fixed broadband, in order to reduce prices and improve services;
- Increase the international bandwidth for the Internet and total coverage of 3G, 4G and WiMax in non-GCC countries;
- Offer ubiquitous Internet access to all institutions, including governmental, educational, cultural, social, and health institutions;
- Make ccTLDs available in Arabic to facilitate Internet access for all people, especially those with limited knowledge of foreign languages;
- Increase all forms of partnerships (PPP, MSP and collaborations with NGOs) for strategy formulation, capacity-building, industrialization, standardization and digital-services provision to optimize the results of efforts in digital technologies development;

- Increase the involvement of Arab countries in IG at the international and regional levels, and establish national IG activities;
 - Adopt cyberlaws for the protection of privacy and digital data; Develop national and regional strategies and legal arsenals to fight cybercrime, including capacity-building of judicial personnel;
- Protect children from abuse on the Internet through awareness-raising, issuance of criminal laws and application of cyberlaws;
 - Cooperate, at the Arab regional level, to effectively fight cybercrime;
 - Increase safety and legality of e-transactions, e-documents and e-authentication through the adoption of international standards for digital environments.

Cluster 3: Digital Economy and Economic Development

This cluster directly relates to the development of the ICT sector, which was not covered amongst the 11 WSIS action lines. However, it was identified by ESCWA as an important sector for development in the Arab region.

A. Strengthening the ICT sector as the supply side of digital economy

Building the ICT sector requires public-private cooperation in addition to the availability of many factors including investment and finance facilities, industrial structure, and research, development and innovation (RDI) capacities. The sector can include operators of telecommunications services, computer hardware manufacturing, software development, service provision, call centres, technical training, Web design and development, digital content development and Arabization, and provision of technological solutions.

This section has the potential for a major economic analysis if quantitative data and information on the ICT sector among participating Arab countries were uniform. Although a structured guiding template was provided to all these countries, the lack of data on this emerging sector in most countries made it more difficult to provide useful data to compare and analyse. Available data from a few countries that started to consider ICT as an

economic sector are presented in an ad-hoc manner, however, without the possibility of appraising and evaluating results, including the impact of the sector on the economy, in a scientific manner.

1. Telecommunication operators and ICT firms

Telecommunications firms in any Arab country are limited in number (between 3 and 15 in participating countries), some of which are government-owned (particularly fixed-telephony companies), and large in revenue and number of employees. IT companies, including ISPs and software development and content companies, are small, count in the hundreds and are mostly private companies, few are public-private and some are owned or licenced by international companies. Except for Jordan and Oman, which have simple statistics on the gender of ICT employees, countries suffer from lack of gender-disaggregated data. More details are given below for each of the participating Arab countries.

In Iraq, three public companies are governed by the Ministry of Communications, while the smaller and more numerous private ICT firms focus on mobile telephony and the provision of Internet and computer services, including software applications design and implementation, some of which are licensed by

large international companies such as HP and Microsoft. Mixed-sector ICT companies, in which the share of the State exceeds 25 per cent, focus on electronic industries.

Jordan has approximately 700 ICT companies, which is a large number by regional standards, and its ICT sector is highly disaggregated. There are nearly 300 software companies, most of which work in software development, 90 in telecommunications and 60 in content. The remaining companies (approximately 260) work in data processing and hosting related services, IT hardware and infrastructure wholesale, training, consulting, research, and maintenance. The largest subsector in revenue terms is the wholesale supply of IT equipment, accounting for nearly 35 per cent of sector revenue, followed by computer programming which accounts for more than 26 per cent of sector revenue. E-commerce accounts for a further 10 per cent of revenue. While the average firm in the IT sector has below \$1 million turnover, two e-commerce firms are identified with an average turnover of \$32 million. The ICT sector in Jordan counts more than 17,000 employees (1.3 per cent of the total workforce), 4,000 in telecommunications and 13,000 in IT, 30 per cent of which are women. ICT workers throughout all economic sectors exceed 60,000 jobs.

In Kuwait, there are 15 officially registered telecommunication companies, five of which provide services in modern communications and ten in Earth-satellite communications. There are 177 digital content companies, including e-commerce, web page design, development and maintenance, and 234 software development companies.

In Mauritania, the following three telecommunications companies coordinate with the State, constantly updating and

increasing the capacity of telecommunications: Mattel, the first mobile phone operator in Mauritania and a product of cooperation between businessmen from Mauritania and Tunisia; Mauritel, established in May 2000 as a comprehensive operator (mobile, fixed line, Internet), strategically partnered with Morocco Telecom; and Chinguitel, founded in 2006, with two licenses for mobile telephony, a third-generation license, international communications, Internet services and pay card platforms. All three companies have played an important role in the socioeconomic development of Mauritania.

The main telecommunications company in Oman is Omantel, offering its private subscribers and the official institutions of the country a diverse range of integrated communications solutions. Omantel provides, among others, fixed line, mobile and broadband services, web hosting, cloud service, domain registration, and secure-sockets-layer certificates. Omantel employs 3,200 persons, with women representing 25 per cent of the total company's workforce. There are nearly 1,800 active ICT firms in Oman, registered under designing, producing and maintaining software and websites.

In the State of Palestine, there are two types of IT companies, namely software and content development companies (numbering 126), and vendors of hardware and software. The State of Palestine Telecommunications Company is the main company for basic communication services. The private sector lacks data on IT workforce, particularly data disaggregated by gender. There is no official policy to encourage the employment of women, but there are workshops and awareness campaigns in this regard.

In the Sudan, there are five telecommunication companies, namely Zain Mobile, MTN, the Sudanese Telecommunication Company, Canar Communications Company, and a Sudanese company for car phones. Other companies for software and content include the Nile Centre for Technical Research, specialized in government programmes and applications such as Ornik 15, and Maarij Company, specialized in e-learning.

In the Syrian Arab Republic, there is no detailed classification of companies that engage in activities related to IT. Most of these companies are listed under the classification of practicing commercial activities without elaborating these activities further. There are approximately 700 companies operating in the IT sector. One company operates in the field of fixed telecommunications (Syrian Telecom) and two companies in the field of mobile communications (SyriaTel and MTN). Furthermore, there are 28 ISPs, four application providers, 16 companies providing vehicle tracking services, eight e-payment services companies, and 16 domain-registration companies.

In Tunisia, there are three operators (Tunisie Telecom, Orange Tunisie and Ooredoo) with a global license (fixed, mobile 2G, 3G and 4G as well as Internet services), one mobile virtual network operator (MVNO-Lycamobile), and a new wholesale infrastructure operator. There are more than 220 small and medium-Sized enterprises (SMEs) operating in the ICT sector, mainly in software and content development.

2. Research, development, innovation, and standardization in the ICT sector

Despite acknowledging its importance for development, most Arab countries do

not have an RDI strategy for ICTs. If they do have one, they have no mechanism to apply the strategy and increase productivity in the sector. Universities and research centres may be carrying out some research, but it is either theoretical or not coordinated with the needs of the ICT industry. Centres of excellence and incubators that are focused on specific needs of the ICT sector provide capacity-building programmes that may lead to novel solutions to local problems. Collaboration with foreign research centres lead, in some countries, to building the methodology for RDI and eventually development of applied research in the ICT sector. This section provides more details on RDI in each of the participating countries.

In Iraq, research and development in the ICT sector is encouraged by the Ministry of Higher Education and the Ministry of Education through tournaments for innovative projects and a division for marketing scientific products of students and professors, in public- and private-sector establishments. Facilities exist in all university with access to scientific software for researchers and graduate students, in addition to collaboration with foreign universities and research centres. CMC established centres for training and scientific research in the field of ICT, to play the role of centres of excellence for innovation and scientific research. Competitions and awards for young entrepreneurs in selected subsectors, if properly sustained, may lead to innovative ideas and products that positively influence the productivity of the ICT sector and have an impact on the economy.

Jordan is committed to serving as an innovation hub in which out-of-the-box ideas can thrive based on local breakthrough technologies, and the entrepreneurial ecosystem supporting entities. Research and

development in ICT is carried out in Jordan at higher education institutions or by public and private research centres. It is mainly funded by different local entities and agencies including universities and in cooperation with international organizations. The REACH 2025 strategy is an ICT-sector strategy mainly focused on innovation. Many initiatives were introduced by both public and private sectors, some of which are ICT Business Incubator (ipark); Oasis500; PremaIT Solutions; the Samsung Research and Development Institute Jordan; and the Columbia University Middle East Research Centre. In the same context, the economic development plan 2018-2022 focuses on promoting innovation and digital economy in Jordan.

The most important initiatives of the Mauritanian Government in the field of science, technology and innovation are the establishment of the National Council for Higher Education and Scientific Research in July 2015; the development of a national strategy for scientific research in a consultative atmosphere and exchange with all national actors; and the establishment of a national agency for scientific research and innovation.

The ICT sector in Oman is developing very rapidly. Among the main initiatives are the Sas for Entrepreneurship Centre, Sas for Mobile and Sas for Virtual Reality.⁴⁷ The initiatives aim to create a new and vibrant ICT industry, thereby fostering an entrepreneurial spirit in the ICT sector. With support from government agencies and private-sector organizations, young start-ups are given the opportunity to take their ideas and ventures to become technopreneurs. ITA (currently the Ministry of Technology and Communications) has undertaken various initiatives to gain and

spread awareness on emerging technology trends and adoption of technologies that are proactive, agile and innovative through the adoption of artificial intelligence, blockchain, data analytics, and more. Currently, proof-of-concept projects are being implemented in various sectors for adopting selected emerging technologies.

The State of Palestine does not have a national research and development strategy. However, the Supreme Council for Creativity and Excellence, which was established in 2013, seeks to play a leading role towards consolidating a culture of innovation and excellence among the Palestinian community. A national strategy for innovation and intellectual property entitled Towards a State of Creativity and Innovation will be developed in cooperation with WIPO.

Initiatives in the Sudan include a software localization strategy, a national software centre and Africa City of Technology. More than 70 per cent of the government software developed within the Sudan rely on open-source programmes. There is a plan to establish 200 emerging companies during 2018-2020.

In 2017, the Syrian Supreme Council for Science, Technology and Innovation adopted a policy called Towards a Knowledge Economy, Sustainable Development and Reconstruction, including a chapter on technology and innovation policy in the ICT sector. Research and development in ICT is carried out in a number of scientific research institutions and universities with master and PhD programmes. The main fields of research and development relate to Arabic language processing, speech analysis and synthesis, software engineering, information systems

and data mining, artificial intelligence, computer networks, industrial automation, digital communication, embedded systems, and e-learning. A series of competitions aimed at stimulating ICT research were sponsored by the Syrian Computer Society in partnership with international organizations and include the following: the Arab Digital Content Competition in 2015, targeting university graduates, entrepreneurs and innovators contributing to the enrichment of digital Arabic content; and the Idea Competition launched by the ICT Incubator between the years 2007 and 2013 to support young entrepreneurs in ICT and encourage them to develop innovative ideas that can be transformed into successful projects.

In Tunisia, boosting innovation in digital technologies is a priority, particularly when applied to such fields as agriculture, education, health, and transport. The Ministry of Communication Technologies carried out preliminary studies in 2016 to focus on IoT applications. In 2017 and 2018, 38 licenses were granted to IoT operators to be able to develop services based on IoT technologies. This is considered a key initiative to boost smart cities and innovation in health, agriculture and local government, among others. Moreover, Tunisia has an integrated national innovation system which includes a Higher Council for Scientific Research and Technology, several research centres, three technology parks specialized in ICT, a network of 15 cyberparks dedicated to teleservices covering the entire country, and eight sectorial competitiveness clusters. This institutional framework has been reinforced with national programmes aimed to promote innovation and scientific research and development. Parallel thereto, in 2016, the gross domestic expenditure on research and

development in science, technology and innovation reached approximately 542 million Tunisian dinar (equivalent to an estimated \$235 million, based on the xe.com exchange rate in 2016) and the total research and development personnel in full-time equivalent exceeded 23,000 persons.⁴⁸

In the United Arab Emirates, the Centre of Digital Innovation supports creativity, innovation and research involving the latest technologies, and provides training on mobile government services, initiatives and projects. It plays an active role in the mobile transformation process of the government as one of the most important strategic initiatives in this context. By utilizing advanced artificial intelligence to monitor and report fire, Etisalat, in partnership with the Ministry of the Interior, will deliver the first smart fire alarm solution in the region that will cover more than 400,000 villas across the country. Furthermore, it launched smart insights services, leveraging on the network-aggregated data to provide insight into transportation authorities, national security agencies and retail companies. TRA implemented initiatives and projects to achieve leadership in smart technological infrastructure and competitive digital economy by developing a strategy of digital transactions.

3. Government facilitation and financing of the ICT sector

Most Arab countries have established funds to encourage investment in projects of small and medium size, particularly those launched by young entrepreneurs, in ICT and other fields, in addition to increasing the number of incubators. They are financing the transformation of the

government using digital technologies. Some countries, such as Jordan, Oman and the State of Palestine, facilitate foreign and national investment in the ICT sector by reducing taxes and simplifying procedures. The establishment of special economic zones with advantageous facilities and services is another form to encourage investment in the ICT sector. Most Arab governments encourage private and public banks to provide loans to start-ups, particularly in the ICT sector, to facilitate the building and expansion of the sector. This section provides information. More details per country are provided in this section.

The Iraqi Government allocates funds to public institutions to implement their projects, including digital networks and encourages banks to finance private sector investments. International organizations such as JICA, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Bank, and KOICA constitute another source to finance ICT projects. Building a smart village to provide a suitable working environment for government institutions and companies operating in Iraq would attract foreign investments and stimulate domestic investment and support for emerging ICT companies.

With a mission to stimulate and activate investments, the Jordanian Investment Commission provides a one-stop service to enable local and foreign investments by simplifying the registration and licensing procedures for investment projects, particularly for start-up IT firms. A package of incentives for the ICT sector reduces or cancels taxes on IT services and provides soft loans for IT activities. The Ministry of Digital Economy and Entrepreneurship (formerly the Ministry

of ICT) is transforming 80 knowledge stations into incubators to allow all entrepreneurs around the country to start up their own businesses by providing a working space and all needed support within the knowledge stations. The Women Economic Empowerment Initiative aims at empowering families and women in Jordan, benefiting from cooperation between the Arab Women Enterprise Fund Programme and the Ministry of Digital Economy and Entrepreneurship. The Government of Jordan provided several incentives to national and foreign investors through provisions for tax exemption and tax holidays for ICT companies under the Investment Promotion Law.⁴⁹

In Kuwait, the National Fund for Small and Medium Enterprise Development, a governmental sovereign fund, is a key enabler of entrepreneurship and innovation, fostering ICT ventures in a variety of ways. The Fund already executed a highly intensive ICT-focused incubation programme providing training and one-on-one coaching to entrepreneurs in addition to seed funding for their projects. ICT projects in Kuwait are mostly concentrated in the service applications and platforms categories and avoid avant-garde technologies, with entrepreneurs avoiding business risks to the highest extent possible and advanced resources required for cutting-edge technological projects in the ICT sector lacking. The National Fund aims to fill the knowledge gap in these areas by planning advanced specialized incubation programmes in collaboration with local private-sector incubators and internationally renowned specialized institutions.

The Government of Oman is financing and facilitating the transformation programme to enable government entities to provide their

e-services either on the web or through applications to the end- consumers in accessible and simplified ways. ICT remains key in achieving sustainable development and in building trust between citizens and the government. Knowledge Oasis Muscat is developing into a vibrant ecosystem that should support the development of technology start-ups in Oman. Multinationals as well as start-ups have been attracted to Knowledge Oasis Muscat, not only by its excellent geographic location, facilities, support services, and tranquil and secure setting but also by its close links with academia. To encourage industrial investment in Oman, the country has established four special economic zones where investors enjoy tax exemptions, trade facilitation and competitive advantages on imports and customs duties.

The Government of the State of Palestine is assisting emerging companies by exempting them from registration and billing fees and taxes for two years. In June 2018, the Council of Ministers approved a package of incentives for projects in the ICT sector, including the following: removing the fees for registration of the pioneer companies located in incubators, universities and the like; cancelling pilot project income tax for two, three or four years; and deducing any contributions made to universities and research centres by investors and companies from profits subject to income tax. Additionally, a number of universities in the State of Palestine have established IT units and centres of excellence aimed at providing specialized curricula, focusing on the important areas of the nascent Palestinian State.

In the Sudan, an investment law was issued to promote exports and increase domestic production. As a result, approximately 250 incubators, start-ups and creative environments were established. The liberalization of the ICT

sector in full since 1993 attracted major private and foreign national investments, and a comprehensive access fund was established by the Ministry of Computing and Information Technology to support IT projects.

The Syrian Arab Republic, through Law No. 2 of 2016, established a specialized body to support SMEs. Two large-scale incubators in the Damascus and Aleppo regions are planned to embrace SMEs in various fields, particularly ICT. The investment environment in the Syrian Arab Republic is governed by Legislative Decree No. 8 of 2007, providing a set of investment incentives for ICT and other developmental projects. These incentives include facilitating import and a set of exemptions from customs duties. The Syrian Business and Enterprise Centre Incubator, established in 2007 to provide special support to entrepreneurs, embraced a number of ICT projects such as a search engine, web application design or e-recruitment. ICT incubators were established by the Syrian Computer Society in Damascus (2006), Homs (2010) and Lattakia (2010) leading to the graduation of 37 start-ups, most of them operating on the global market. It should be noted that the technological blockade imposed on the country, which has intensified with the war, is one of the main obstacles to investment in the ICT sector.

In Tunisia, the Start-up Act programme, an unprecedented legal framework dedicated to start-ups and supported by the Tunisian Government, gives tax benefits and many other advantages to start-ups in all sectors, especially in the ICT sector. It was developed with the participation and collaboration of all stakeholders of the entrepreneurial ecosystem in Tunisia under the supervision of the Ministry of Communication Technologies and Digital Economy. It includes a series of incentives to

encourage potential entrepreneurs such as young professionals, researchers and young graduates to undertake and launch their start-ups. Since investment plays a major role in the economic and social development process, whether in terms of wealth creation, entrepreneurship building or job creation, a “fund of funds” was created in collaboration with international financial institutions to complement the start-up programme and to support entrepreneurship in Tunisia.

The United Arab Emirates is promoting the fintech aspect in the technology sector. The Central Bank is engaged in GCC and Arab fintech initiatives with teams assigned to fulfil their mandate. Providers such as Khalifa Fund, Abu Dhabi Global Market and ICT Fund support start-ups in the technology field.

B. General impact of the ICT sector on the economy

1. Contribution of ICT sector to the national economy

ICT revenues for participating Arab countries are not always available, but the contribution of ICT sector to the GDPs of these countries varies between 0.6 per cent and 6 per cent for the past three years. These contributions are mainly from telecommunications. ICT expenditures for the whole sector do not seem to be available for most of these countries.

It is worth mentioning that information is neither available on trade in ICT goods nor on percentages of purchases over the Internet from various countries.

Jordan’s ICT revenues were \$1,973 million for 2015 and \$2,047 million for 2016. The contribution of the ICT sector to the GDP was 2.7 per cent in 2014 and 3.0 per cent in 2015. Since the development of a digital economy is dependent on the use of ICT, increasing the use of such technologies in all sectors should revitalize the Government’s digital transformation programme. Furthermore, telecommunication services offered to the users need to be affordable, universally available, secure and reliable, so that the full range of e-government applications can be used.

Oman’s IT market value in the years 2016, 2017 and 2018 reached \$187.9 million, \$190.4 million and \$195.7 million, respectively. The contribution of the ICT sector to the GDP in each of these years hovered around 0.6 per cent. The e.Oman strategy provides the blueprint for the growth in ICT usage and connectivity. With a mobile penetration rate of 156.7 per cent and a high Internet penetration rate (fixed Internet at 46.1 per cent and active mobile Internet at 72 per cent) coupled with a high PC penetration of 83 per cent in 2013, e-government services have become prevalent. The ITA, as the main custodian of the e.Oman strategy, provides the stewardship to proliferate ICT as a constituting tool and enabler of public-service delivery.

In the State of Palestine, the share of the ICT sector in the GDP was 5.85 per cent in 2014, 4.07 per cent in 2015 and 4.09 per cent in 2016. This includes building and developing of infrastructure, update and upgrade of equipment, training, operating expenses, purchasing and development of software and applications, and management and development of websites and social networking sites. The main determinants of ICT contribution to growth are related to

education, manufacturing, cost of ICT, and investments. ICT can contribute more to the economic growth of the State of Palestine through the improvement of education and provision of computer labs connected to the Internet in schools to enhance students' skills; the development of medical services and the connection of all hospitals and medical centres; and the creation of jobs in the field of ICT, thereby also reducing the unemployment rate.

In the Sudan, the ICT sector contributes 4 per cent to the GDP directly and 9 per cent indirectly. This includes expenditure of government institutions on training and rehabilitation of workers, infrastructure and equipment, development of software, scientific research, and innovation.

In the Syrian Arab Republic, ICT revenues are not available for the period 2015-2017. While information on revenues of the fixed and mobile telecommunications sector are precise, data on IT market revenues are unclear. In the years 2015, 2016 and 2017, telecommunications revenues reached 251 billion, 298 billion, and 370 billion Syrian pounds, respectively (equivalent to an estimated \$1,330 million, \$1,369 million and \$1,727 million, respectively, converted based on the official exchange rates of each year). Hence, the contribution of the telecommunications sector to the GDP was 3 per cent in 2015 and 2016, and 2 per cent in 2017. Investments of mobile operators during the period 2015-2017 were mainly focused on restoring and rebuilding their network, which was damaged by the war. The Syrian Telecommunications Company focused, during the war years, on expanding the network to increase the number of Internet subscribers from less than 100,000 in 2011 to 1,400,000 in 2018. It is also planning to install 80,000 broadband Internet gateways, mainly in the

countryside, using the universal service fund, and improving the company's clearing systems. The war in the country raised awareness on the role of ICTs in preserving the national and cultural characteristics of society, ensuring the continuity of services delivery, and providing successful solutions to war-related challenges.

In Tunisia, the contribution of the ICT sector to the GDP was estimated at 4.7 per cent in 2015, 4.6 per cent in 2016 and 4.3 per cent in 2017. Regarding the ICT entrepreneurial field, more than 80 private companies are located in the Elgazala technology park creating some 2,500 jobs, in addition to 166 companies installed in cyberparks, with an occupancy rate of technological spaces of 80 per cent in 2018. In 2017, the percentages of ICT graduates in the public and private sectors were 15.6 per cent and 18.5 per cent, respectively. In 2019, some 100 companies obtained the start-up label, 20 companies registered for patents and more than 1,000 jobs were created.

In the United Arab Emirates, the combined revenues from Etisalat and Du in the years 2015, 2016 and 2017 were some 41,111 million, 43,070 million, and 44,212 million dirham (AED), respectively (equivalent to an estimated \$11.2 billion, \$11.7 billion and \$12 billion, respectively). TRA estimated that the 2017 contribution of the ICT sector to GDP was some 9.3 per cent, equivalent to AED 129 billion (equivalent to some \$35 billion). If the economic contribution to direct impacts, namely licences accounting for leakage due to imports of goods, services retailers of telecommunications services and upstream firms that employ staff in the country, is isolated, the economic contribution is estimated to be around AED 38.1 billion (equivalent to some \$10.4 billion) in 2017.

2. E-business, e-commerce and e-banking

Most Arab countries have e-banking and e-commerce laws, in addition to e-services laws for e-business, as summarized in table 20. While in GCC countries e-banking, e-commerce and e-business are flourishing, other Arab countries are still struggling

with the adoption of e-payment processes and e-commerce (business-to-business and business-to-consumer) by many companies and citizens. The volume of online purchases remains very small compared to physical purchases even in GCC countries. The below narrative provides more details on the participating countries.

Table 20. E-business laws and services

Country	E-banking services/laws	E-commerce laws	Other e-services/laws
Iraq	Credit cards and e-payment laws under preparation and adoption	Laws are limited to banks and private-sector companies	Visa and Master cards, PayPal and cash-on-delivery are allowed
Jordan	E-Payment and Transfer By-Law No. 111 of 2017	E-Transactions Act No. 15 of 2015	E-Transaction Act No. 15 of 2015
Kuwait	Law No. 32 of 1986	...	Law No. 20 of 2014
Mauritania	Law No. 036 of 2018	Law No. 022 of 2018	Law No. 020 of 2017 Law No. 034 of 2018 Law No. 037 of 2018
Oman	...	Telecommunications Act Law No. 30 of 2002 Cybercrime Law No. 12 of 2011	Law No. 69 of 2008
State of Palestine	Law No. 9 of 2010 Law No. 16 of 2017	Law No. 16 of 2017	E-Transactions Act No. 15 of 2017
Sudan	...	Available ^a	E-Transactions Law E-Crimes Law Right-to-information Law
Syrian Arab Republic	...	Law No. 3 of 2014	Law No. 13 of 2012 regarding the establishment of the Syrian company for e-payments
Tunisia	Law No. 51 of 2005	Law No. 83 of 2000	Secured payment systems of the Tunisian Monetary Company E-Dinar Platform (Tunisian Post)
United Arab Emirates	Available through all major banks	Mature platforms with the e-channel encouraged for most major outlets	...

Source: Compiled by ESCWA from the National Digital Development Reviews, 2019.

Note: "..." indicates having no information.

^a "Available" refers to e-banking services. There may not be a specific law for e-banking, but banks can initiate such services and obtain approval from the national central bank. The existence of a law for e-services implicitly implies the existence of such services.

The Central Bank of Iraq is working on a project to pay salaries to State employees through automated-teller-machine (ATM) cards issued by banks operating in the country. The project aims to reduce the total cost of paying salaries and maintain cash within the banking system. Although the ICT strategy includes clauses to facilitate e-commerce, it is still very limited and only available through banks and private-sector companies which offer e-payment cards to all their clients. An e-banking law is under preparation and adoption. E-business has seen a significant increase in recent years alongside the establishment of specialized sites for the sale of goods and the promotion of goods through social networking sites. Payment is done through credit cards such as Visa, MasterCard and PayPal, in addition to payment upon delivery for those customers who do not use e-payment.

While business-to-consumer e-commerce has not taken off in Jordan, approximately one quarter of all establishments buy or sell online. In 2016, 28.3 per cent of all establishments were aware of e-commerce, doubling the proportion of 2014, and 27.6 per cent of establishments used e-commerce for buying and selling. The number of establishments reported as receiving orders online increased by 63.6 per cent between 2014 and 2016. Mobile payment services are run as separate units from mobile operators, for instance, Zain Cash. Merchants can set up wallets/accounts with several mobile payment providers, and individuals associate their phone number with their own wallet. As all payment service providers are attached to the Jordan mobile payment company JoMoPay, interoperability is guaranteed. Acceptance by retailers remains a major challenge that needs to be addressed for mobile wallets to be useful.

All local banks in Kuwait offer well-diversified and sophisticated electronic services to their

clients through their online portals. In addition, there are many effective e-commerce websites. B-to-business and business-to-consumer applications in Kuwait are very mature. E-payment systems are available and widely used. In particular, the governmental electronic payment programme Tasdeed is available to the public and provided through a partnership between the Ministry of Finance and KNET, a company providing shared electronic banking services. In July 2015, the Central Bank of Kuwait issued regulations regarding the banking services provided to special-needs customers, setting the minimum requirements for banks to offer these services to their customers with special needs, which include online banking services.

In Mauritania, the banking services and digital transactions are still very limited, and banks offer services to customers directly through the cashiers or through ATMs. Banking, finance and e-commerce have not yet emerged, but Central Bank projects may help change this reality. The Digital Infrastructure Project aims to develop the national payment system to simplify and automate payment settlements across banks in real time. The Core Banking project allows operations to be conducted at the level of the Central Bank and will be linked to the national e-payment system. The Cybersecurity Project is expected to produce a new security policy in cooperation with a specialized French institution in order to secure the information system and follow international standards.

In Oman, a whole-of-government approach is adopted by the Cabinet of Ministers in accordance with the e-transformation mandate. Participation of several government entities and NGOs in the initiative provides the backbone of business e-services, including a national business register, a national business

licensing system and annual reports. The national e-payment gateway provides an operational component of the e-governance infrastructure and full e-commerce facilities that allow secure online payments. E-commerce in GCC countries is expected to hit \$41.5 billion by 2020. Web sales and home delivery make up less than 1 per cent of all purchases.

In the State of Palestine, banking services are mature but not at the desired level. E-payment systems are available, but there is no information on whether they meet international standards.

In the Sudan, there are no online banking services but some e-commerce services are offered via social networking sites. Certain business-to-consumer services are provided by telecommunications companies and car-maintenance companies. Business-to-business services exist, for example, between electricity and generation companies, on the one side, and distribution and oil companies, on the other. The Sudan has an electronic business model, and there are multifunctional electronic gates, but gender differences are not considered in their design.

The entry of the Syrian Arab Republic into e-business continues to falter due to the delayed completion of the e-payment environment and the limited availability of modern banking services. E-commerce is still uncommon for many reasons, including lack of e-payment, lack of credit cards, lack of awareness about e-business, and inefficiency of the postal operator. Despite the licence granted to the private sector to practice banking along with public-sector banks and the number of private banks operating in the country (14 private banks versus 6 public banks), their services to the e-business sector remain limited due to slow

settlement and clearing systems between banks and linking of ATMs. Certain steps are being taken to develop the banking structure, including the development of the real-time gross settlement system by the Central Bank; banks setting up their own, yet limited, e-payment systems; and the establishment of the Syrian E-Payment Company, responsible for implementing a unified national e-payment system.

Tunisia was among the first countries in the region to get involved in e-commerce. Indeed, the year 1999 was marked by the creation of a national e-commerce commission in charge of setting up a strategy for the development of the sector. Law No. 83/2000 established a regulatory framework for e-commerce in accordance with best practices adopted in the world. Two national secured electronic payment solutions are offered, namely the secured payment systems of the Tunisian Monetary Company and the E-Dinar Platform of Tunisian Post.

In the United Arab Emirates, online banking portals are available through all major banks, and e-commerce platforms are quite mature with the e-channel encouraged for most major outlets. Access of men and women to financial and e-business services is equal. The standard of electronic payment systems is available exclusively at the national scale using various electronic payment methods such as ATM cards and mobile money. Persons with disabilities were not considered in the design of electronic payment systems.

3. Direct employment and job creation induced by the ICT sector

The ICT sector seems to create new jobs for youth in Arab countries due to the new trends in digital technologies and their expansion, supported by

government-led initiatives through the incubation of start-ups in digital technology fields and encouraging the employment of new graduates. The GCC countries are implementing new policies to increase the employment of nationals in the ICT sector. Very few statistics are provided, however, regarding growth in ICT employment, and practically none regarding the employment of youth and women. Jobs lost due to increased automation of industrial and commercial operations may be partially offset by new jobs in ICT for which training is necessary, particularly in communication and social networking applications, but very few statistics are available on that issue. More details on a country-by-country basis are given below.

In Iraq, close to 15,000 employees in various ICT specialties work in the public sector. More jobs exist in the private sector, namely in mobile companies, ISPs, and applications and software development.

In Jordan, in spite of growth in number of mobile and Internet subscribers since the year 2000, the level of employment attributable to the sector has fallen considerably over the last five years. In the last three years, IT employment grew at an average rate of 4 per cent per year. Employment of ICT graduates was at 33.4 per cent in 2015 and 39 per cent in both 2016 and 2017. ICT affects employment both as an industry that generates jobs and as a tool that enables people to acquire new and more flexible types of work. New ICT-based opportunities helps countries worldwide to create more and better jobs with a positive impact on the economy and society. Jordan's vision in this respect is based on its strengths and opportunities and focuses on

four main themes, which are innovation, entrepreneurship, government digitization, and skill upgrading. With 5,000-7,000 new companies operating in the digital economy, Jordan is expecting an increase of 6-8 per cent in GDP, 13,000- 15,000 new jobs and an increase in revenues of 25-30 per cent.

In Kuwait, IT affects the growth of employment in many ways, including a significant shift in the labour market. ICT has created new jobs and made labour markets more innovative, while requiring staff to keep up with the new developments in ICTs. These new opportunities seem to favour youth since they have more knowledge of new ICT tools and applications.

In Mauritania, the ICT sector has contributed significantly to the creation of direct and indirect employment opportunities, with a shift in labour markets that requires innovative people who are capable of networking and working remotely and globally. Current statistics do not provide accurate figures on the employment of young people and women, but they reveal that more than 120 ICT projects were founded lately and more than 580 jobs were created, mostly for youth. Although technology trends threaten certain jobs, they create daily opportunities for employment and even unleash viable economic sectors. However, current statistics do not provide definitive figures to assess the net job creation through the use of ICT over the years. The main obstacles to large-scale e-recruitment in Mauritania are financial, technical, cultural, and work-related.

In Oman, workers employed by the private sector in telecommunications related activities represent nearly 31 per cent of the total. Omani workers dominate the wired telecommunications sectors while expats are the majority in wireless telecommunications-related activities.

In the State of Palestine, employment in the government is done through fully computerized procedures, whereby tools are used to select applicants for various jobs impartially and transparently, speeding up the selection process and reducing time and paperwork. People who specialize in this field are among the most demanded in advertised jobs. ICT also contributes to job creation for youth and women. Although ICT leads to the automation of certain functions, more modern functions require the creation of new jobs.

In the Sudan, ICT has greatly contributed to employment growth in various sectors that have introduced technology, hiring engineers, programmers and technicians to manage, develop and operate systems, networks and databases. Furthermore, ICT has contributed significantly to creating employment opportunities for young graduates through new markets and through the launch of new companies. Although the automation of operations in a number of vital sectors reduced the labour needed, such as the e-clearing between banks, control of communication centres and ATMs, other ICT-based functions, such as social networking applications, created new jobs that compensate for this reduction.

In the Syrian Arab Republic, there are no clear studies or indicators related to the contribution of ICT to job creation. However, such contributions can be inferred from a number of experiments that confirm the ability of the Syrian market to attract many ICT businesses and activities that create opportunities, especially for young people. Many companies operating abroad outsource their software development to local ICT specialists.

In Tunisia, several initiatives have been launched by the Ministry of Communication

Technologies and Digital Economy encouraging job creation, including the promulgation of Law No. 20 of 2018 on start-ups, to increase value-added jobs for Tunisian graduates, to reduce the brain drain and increase the chances of success of start-ups through innovation. Another initiative is the mDev/TunCode Project for the development of mobile applications that target Tunisian youth, in particular in rural areas. This project provides training for new ICT graduates from all regions of Tunisia by means of a massive-open-online-course (MOOC) training platform through the Virtual University of Tunis, supported by online tutors in equipped premises in cyberparks in the 24 governorates. The project resulted, so far, in five well-established start-ups, others currently seeking funding for their projects/start-ups, and the remaining 60 per cent of the graduates working freelance. The Smart Tunisia programme as part of a PPP, responds to the revitalization of offshoring through the provision of incentive mechanisms in order to converge demand and supply labour, with the ambitious goal of creating 50,000 jobs by 2020 in the areas of offshoring, nearshoring and colocation.

The Government of the United Arab Emirates is expecting a high increase in nationals within the workforce over the next 10 years driven by an increase in the demographic growth rate. In practice, this would require youth to have the necessary skills to join the private sector. It also requires the country to support its nationals in building their skills by leveraging government accelerators focusing on setting national key performance indicators, developing policies, creating projects and expanding services. For the ICT sector, national employment targets were set by the Ministry of Human Resources and Emiratization in partnership with TRA and the private sector, including telecommunications companies such as

TECOM Group, Etisalat and Du. The outcome was positive, and the objectives were achieved according to the set-out employment targets. Government efforts to build a knowledge-based economy and increase participation of citizens in the labour market through enhancing women's participation and increasing Emiratization rates in value-added economic sectors should lead to higher rates of employment. With the onset of the fourth industrial revolution, technological disruption will have an impact on the labour market. Hence, nationals need to be equipped with the right skills to succeed in the private sector, through training for jobs of the future and higher-education reorientation programmes.

4. Boosting e-employment and the labour force at large

Various forms of e-employment are widespread in the Arab countries, including university websites for graduates' résumés; specialized offices for employment supporting databases of job vacancies announced through SMS or email and matching with CVs and job applications; social networks posting CVs and work announcements; and public-sector employment portals. However, official teleworking is limited to a few countries such as Jordan and the State of Palestine, mainly to encourage youth employment. No specific teleworking initiative is aimed at women and the disabled. More details for each of the participating Arab countries are provided below.

In Iraq, most universities have units to follow up on graduating students through databases (including CVs and contact information of graduates) to help them find jobs. Also,

a number of retired professors designed a website allowing graduates to register and upload their CVs. The website allows private-sector companies to view the database and contact the graduates for the purpose of employing them. A recent governmental circular directed all ministries to add a link on their websites which would allow new graduates to apply to work at these ministries. Employment committees assess the application forms and publish the names of the accepted applicants on the website.

In Jordan, advanced steps have been taken to use ICT as a means to locate employees and to find employment, mainly through the Civil Service Bureau, which supports employment using a website that provides numerous services to citizens including announcing job vacancies, holding a national database for résumés and handling the employment cycle for applicants. By law, the Civil Service Bureau facilitates teleworking for IT employees in order for them to work anywhere and enables hearing-impaired people to communicate with the Bureau in all its branches in the sign language. Since 2017, a work-from-home permit can be issued as a licence to practice work from home to enable young entrepreneurs to start their projects at reduced costs, thus increasing their chances of success and empowering them to work legally. The Ministry of Digital Economy and Entrepreneurship (formerly the Ministry of ICT) launched an initiative called Knowledge Stations for Employment in Governorates, which recruits ICT graduates to work remotely in the knowledge stations of the governorates they live in. The ICT Policy 2018 requested the Ministry of Labour, together with concerned municipalities, to facilitate and promote the opportunity for IT workers, particularly women, to work from their homes as employees, since women may stop work once they become

mothers and often lose their skills and expertise. Women comprise a relatively high proportion of employees in the IT sector, therefore losing them is particularly noticeable.

In Kuwait, ICT provides a means to search for employment through advertisements on social networking sites or by submitting applications on the Internet. Nowadays, many electronic applications exist that assist in publishing advertisements, and all entities/employers in Kuwait require employees to submit documents electronically, either via email or by uploading the documents on their sites.

In Mauritania, there is a governmental portal where all public-sector job announcements are published and where applicants can prepare their CVs.⁵⁰ There are also private sites for the follow-up and dissemination of work offers in the public and private sectors.⁵¹ The National Competitions Portal provides a database of all applicants for public competitions, and the Employment Portal of the Central Bank provides a database of financial-sector certification holders. The National Agency for Youth Employment website also publishes many employment offers and a database of unemployed graduates.⁵²

In Oman, e-employment is one of the integrated e-services offered by the Ministry of Manpower to Omani citizens as part of its E-Government Transformation Strategy. The Ministry plays a key role in matching qualified jobseekers to suitable jobs in private sectors, thus contributing to reducing unemployment rate in the country. The e-recruitment system is designed as a single access point which enables jobseekers to search, view and apply for suitable jobs in the private sector according to their qualifications in a timely manner using the Ministry's website or a mobile application.

Employers can enter contracts online, and the system automatically assigns each contract to a suitable job seeker. Most e-employment-related data are collected from different sources through web services.

The Palestinian Government has a special employment portal as part of the General Staff Office, including a large number of résumés and a bank of e-questions.⁵³ The Ministry of Labour built a gateway for the Palestinian labour market information system.⁵⁴ The number of teleworkers at local and international enterprises and companies is increasing; however, teleworking is not common at the local level.

In the Sudan, the announcement and submission of government jobs and the selection results are published electronically through the Civil Service Selection Commission and a large number of companies operating in the field.

In the Syrian Arab Republic, the use of ICT for job search remains limited to a range of websites that provide job opportunities, including the Shamra jobs website, a private initiative which provides services to business owners, employers and job seekers alike.⁵⁵ At the governmental level, the Ministry of Social Affairs and Labour established a central database of applicants wishing to obtain employment through its employment offices in all governorates. The work of the employment offices is being automated to facilitate the provision of services to citizens and to the career guidance centre, which provides several services linking the private-sector market to requests for employment.

In Tunisia, the Agency for Employment and Self-employment, as a public establishment with no administrative character placed under the

supervision of the Ministry of Vocational Training and Employment, ensures the implementation of government policies related to the promotion of employment through the animation of the job market, at national, regional, local, and sectoral levels, using the network of offices of employment and self-employment and the job online portal. This online portal allows people looking for a job to browse available jobs and to submit their CVs.⁵⁶ In addition, the Ministry of Vocational Training and Employment developed a platform dedicated to national competitions,⁵⁷ for the public to allow job seekers to register and participate in open competitions in the civil service.

In the United Arab Emirates, online job portals, mobile phone applications and social media platforms are all used to search for employment. The Tawteen Gate Portal at the Ministry of Human Resources and Emiratization seeks to boost the participation of national human resources in the strategic priority sectors and in alignment with its vision and strategic goals. The Ministry, through the Wajehni smart application aims to connect students with summer jobs and internship opportunities. The application also provides support from academic institutions and counsellors and prepares students to enter the job market.

C. Towards enhancing digital economy and economic development – related policies

The information and analyses provided in cluster 3 reveal information and policy

gaps on digital economy, employment and trade in most Arab countries. The following enhancements are suggested:

- Provide information on ICT firms, including small IT companies, in particular classification, size, revenues, and workforce by gender;
- Develop RDI strategies in ICT aligned with the needs of the industry;
- Collaborate in RDI at the regional and international levels;
- Facilitate investments in Arab countries through special economic zones with reduced taxes and simplified procedures, noting that a number of countries already introduced such facilitations, particularly the GCC countries, Jordan and Tunisia;
- Collect and provide information on ICT revenues and contribution of the ICT sector to the national economy;
- Collect and provide information on trade in ICT goods and online trade;
- Facilitate e-payment and e-commerce processes, noting that GCC countries and a few others have been carrying out these processes for years;
- Collect and provide statistics on employment in the ICT sector, with disaggregated data for women and youth;
- Provide statistics on e-employment, with disaggregated data for women and youth;
- Consider teleworking as a legitimate form of employment;
- Develop national labour market information systems.

Cluster 4: Digital Transformation and Social Development

This cluster directly relates to WSIS action line 3 on access to information and knowledge, action line 4 on capacity-building, and action line 7 on ICT applications: benefits in all aspects of life. Annex 1 includes the topics covered by the WSIS action lines.

ICTs allow people, anywhere in the world, to access information, knowledge and content almost instantaneously, thus, benefiting and empowering individuals, communities and society at large. Digital transformation aims to promote and increase access to relevant public-domain information, knowledge, applications, and content. Access to information and knowledge entails access to general public information, scientific knowledge, digital public libraries and archives, ICTs for all initiatives, open-source and free software, and public access to information.

A. Digital transformation, inclusiveness and empowerment

This subchapter provides narrative based on the input from the 10 countries participating in the NDDR process, which is summarized below. It provides qualitative analyses of inclusiveness and empowerment. Chapter 3 will complement this approach and provide standalone detailed analyses to define inclusiveness and empowerment from a quantitative standpoint.

1. Inclusiveness through access

Inclusiveness may have different connotations, but, in the context of social inclusion, it relates to access to ICT and implies the availability, affordability and adaptability of ICT to all, whether rich or poor, men or women, youth or elderly, disabled or in full physical capacity, living in the city or in remote areas. In all Arab countries, some form of multipurpose community access and knowledge centres are available for free in certain remote and disadvantaged areas to make the Internet available to all and provide training, but their number is not enough, and they do not cover the entire country. Most of these centres are equipped to facilitate access by the disabled and are accessible to youth, even children, and girls and women. Although access to basic information is relatively affordable, broadband access from homes and smartphones may not be for many low-income families. Digital libraries related to education and research are open to all and for free in most Arab countries, but access through the Internet remains difficult and unaffordable for a large stratum of the society.

CMC in Iraq initiated the implementation of a comprehensive service project which aims to enable all segments of society to benefit from

telecommunications and information services throughout the country. Through this project, CMC seeks to provide voice-communications services to remote areas and communities without telecommunications services and to establish IT centres and laboratories in primary and secondary schools, thus contributing to enhancing the capacity of students in this field.

Broadband Internet access is available in most areas of Jordan, though there are challenges of affordability impeding the uptake of broadband Internet services. Only the more affluent households can afford fixed lines or smart phones required to access the Internet. Given the monopoly of Orange on landlines, the 16 ISPs have used Orange's copper network for the last-mile connectivity, particularly for asymmetric-digital-subscriber-line (ADSL) services. This situation is changing rapidly with all of the major operators, including the electricity provider, now installing local fibre cables. Use of the Internet is increasingly dominated by social networks and chat services, followed by games, newspapers, email, music, and other media. The 196 knowledge stations in Jordan aimed to enable all segments of the Jordanian society, irrespective of their geographical location or economic status, including women, the underprivileged and underserved, children, labourers, farmers, and the illiterate, to participate in the digital economy by providing access and training in ICT, mostly free of charge.

Kuwait has provided access for the public to information via different channels using the Internet, with no exclusion or gender sensitivity. Internet services are provided by ISPs and telecommunication companies, regulated by CITRA, to cover all the needs of society with different plans that vary in price to

fit all budgets. Additional means of access for the public are coffee shops and shopping malls where Wi-Fi and open networks are available.

The Omani Government promotes access to public domain information in order to ensure transparency and reliability of public institutions. Government institutions are encouraged to make open government data public through a central open-data portal, given the benefits of open-data usage to society in general. Different initiatives were introduced for that purpose by stakeholders in various sectors, including the National Centre for Statistics and Information, the National Spatial Data Infrastructure and the Ministry of Education's Open Data Library. Free Wi-Fi connectivity for the public is widespread, including at airports, hospitals, universities, transportation services, and tourism locations. The number of free mobile Wi-Fi hotspots in Oman is estimated to be 84,418. The Omani Government has set plans and programmes that guarantee that every member of the society (citizen, migrant, woman, child, youth, and person with disability) gets equal e-services, providing the society with the necessary ICT tools to access information and participate in decision-making.

In the State of Palestine, anyone can access traditional public libraries and borrow books free of charge. Some public libraries uploaded books in PDF format on their website, and anyone can access the site free of charge and download the required book. There are also a number of digital libraries that offer their services online free of charge, such as electronic libraries for university students. In some municipalities, such as Ramallah and Al-Bireh, Internet access is available free of charge in public areas, which can be a step towards the concept of smart cities. Most rural

areas have been connected to the Internet free of charge by the Palestinian Government, which is working towards providing telephone lines to all in these areas.

The policy of the Sudanese Government is to mainstream ICT access and provide services at affordable prices, ultimately accessible to all, including persons with disabilities. Internet rates and telephone calls in the Sudan are among the cheapest in the world, where the user can subscribe at less than one United States cent per day and can subscribe to an Internet package including 2GB data for one dollar a month. There are special sites for women in the centres for Sudanese women and universities. The Internet is available free of charge in many government agencies, companies and organizations, and at discounted rates in universities. 172 access centres were established and distributed in the rural areas of the eight states of the Sudan. They were provided with computers and electricity sources and made available to users of both sexes, with some for youth and women's organizations. The main obstacles to access ICT are the lack of electricity in some areas and the lack of specialists in remote areas for supervision, training and care, in addition to the great size of the country and consequent remoteness of some populations.

In the Syrian Arab Republic, official information is disseminated through governmental websites, public bodies and social networking pages. With the increasing development value of open government data, MoCT has incorporated its own programme into the plans set out for the post-war period up till 2030. The official statistical information, mainly related to economic and social activities, is published on the website of the Central Bureau of Statistics in Arabic and

English. Cultural and scientific information is available digitally for free from websites of the Ministry of Culture, the Al-Assad National Library, the Arabic Language Academy, Arabic Encyclopaedia, Virtual University, and Shamra Academia. However, none of these have presented this information in a format suitable to persons with disabilities. The Rural Knowledge Network has rich content in the fields of agricultural, law, sciences, and heritage. The Blog of the Country includes a collection of articles classified according to topics including literature, art, places, and monuments. Access centres to serve the disadvantaged, including women, youth and the disabled, with ICT training activities, were established through a phased project for the development of the Syrian countryside initiated by MoCT and UNDP in 2010, with 35 fixed and 5 mobile access centres. An expansion to reach 59 access centres was agreed upon with the Syrian Computer Society but was not implemented due to the circumstances of the war.

In Tunisia, the Ministry of Women, Family and Child Affairs, using ICT tools, provides counselling services for women and girls who are victims of violence by sector of intervention in each of the 24 governorates.⁵⁸ Other websites compile statistics relating to data on violence acts. The Programme of Digital Houses for the empowerment of women was implemented as part of a PPP between the Ministry of Women, Orange Foundation and the general management of Orange in Tunisia. It aims to implement an ICT training programme for women entrepreneurs. For rural and underserved areas, a project was set up called Houses of Public Services. These are 44 administrative centres located in isolated and rural areas offering assistance and a number of administrative services to citizens of

nearby areas. A new initiative consists of offering administrative services in rural areas using an equipped small bus which moves around small cities offering administrative services at scheduled places and times. A platform called e-people (www.e-people.tn) was developed to link all citizens relationship offices and offer a web interface for citizens to deposit complaints, questions and proposals.

The website of the Ministry of Community Development (MOCD) in the United Arab Emirates includes rules and regulations related to children law, senior citizens and social security groups which include targeted disadvantaged groups. In addition, the website is designed to provide easy access for people of determination and the elderly. The Open Data Platform and Madrasa are examples for such initiatives. There are different access channels through the MOCD website, mobile application and customer-service counters. MOCD provides social aid to 21 different categories and enables the beneficiary to have an improved lifestyle through access to the Internet. MOCD has published the Emirates Code to govern services provided to people of determination. The MOCD website provides ease of access to persons with disabilities through different tools such as sign-language, text-to-speech and social media provisions.

2. Empowerment through meaningful Internet use

Empowerment holds various insinuations, but in the context of social inclusion, it relates to the use of ICT in education, entertainment, political engagement, and for economic benefits. In this perspective, institutions and centres were established in several Arab countries to provide training on ICT innovative tools and policies to

increase the capabilities of citizens, empowering them with knowledge and capabilities to harness ICT for sustainable development. Ministries of education and higher education got also involved in such training centres in schools or universities. Virtual universities have been established in a small number of Arab countries to facilitate studies using distance education and online technologies. Mobile applications were developed locally in few countries such as the Syrian Arab Republic, and application stores were built for distribution. In chapter 3, more focus is made on the role of digital development for empowerment through digital economy and data-driven development perspectives. Summaries of NDDR input related to empowerment are given below.

In Iraq, CMC adopted an initiative for persons with disabilities to ensure equal opportunity for all segments of society and to integrate them into the community. CMC opened a training centre in cooperation with ITU for those with a certificate in ICT, to develop a comprehensive access policy involving public and private sectors. In cooperation with the Ministry of Higher Education and Scientific Research, CMC released programmes of competitions in ICT under conditions that encourage innovation, teamwork and scientific competition for all Iraqi students.

In recent years, women in Kuwait have been empowered by taking high-level positions in different sectors and participating in the decision-making process for the advancement of major projects nation-wide, owning and running successful businesses and participating in the political and academic sectors. In short, women are active in all fields that are directly connected to the information society and SDGs.

In the Syrian Arab Republic, ICT has played a major role in the lives of citizens during the war, mainly through social networking platforms as a result of its ease of use and being widespread among citizens, reaching more than 6 million users (37 per cent of the population) in 2017. It helped citizens document events and obtain information that helps them in their daily lives under the difficult conditions of war. For example, the webpage Mortar Diary contributed to providing details on sites targeted by missiles, and other pages focused on human assistance, publishing the names of the missing and providing information to their relatives. As a result of the dispersion of family members, within or outside the Syrian territory, ICT and social media, particularly WhatsApp, allowed family members to communicate with each other on a daily basis. Additionally, the Me and My Family platform launched by SCS in collaboration with the UNFPA Youth Programme, permitted to review Syrian family life and discuss issues that are of interest to its members. ICT has contributed to overcoming some of the difficulties faced by pupils and students to attend school or university, especially in areas that have been out of State control through educational platforms provided by the Ministry of Education and copies of electronic curricula published on their sites. The Syrian Virtual University provided an opportunity for a large number of students to study remotely during the war. The Rural Knowledge Network portal played an important economic role by marketing rural area products including handicrafts made by women. SyriaStore, an application developed jointly by MoCT and the mobile operator SyriaTel is a Syrian mobile application store that enables the download and update of all

Syrian service applications, and updates of the most popular applications. There are presently more than 60,000 users of SyriaStore and 3,400 applications, and daily requests for download reach more than 169,000.

In the United Arab Emirates, the Ministry of Economy recently adopted concepts and mechanisms relative to benefitting from the country's orientation towards an open data policy, such as the utilization of smart business tools, the development smart e-services and direct access to customers anytime and from anywhere. As such, the Ministry established regionally and globally leading platforms which are considered the first of their kind compared to available platforms that display foreign trade data of countries. These leading platforms provide fast and accurate information and contain important indicators needed by users. The government introduced, in 2011, e-voting as a technology-led mechanism for public participation in electing members of the Federal National Council, the first e-voting experience in the region. Today, citizen engagement and e-participation are strongly acknowledged as vital processes enhancing government efficiency and sustainable development in the country. Recently, the United Arab Emirates ranked 13th globally in the e-participation index of the United Nations, which measures the process of engaging citizens through ICTs in policy and decision-making to make public administration and service provision participatory, inclusive, collaborative, and deliberative.

One of the main activities in the region related to digital inclusion is the ITU-UNESCO Regional Digital Inclusion Week for Arab States, in which ESCWA has been a regular partner and speaker. Box 3 provides highlights on this activity.

Box 3. The ITU-UNESCO Regional Digital Inclusion Week for Arab States

Since 2017, the International Telecommunication Union (ITU) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) have been organizing an annual regional digital inclusion week for Arab States. The week is organized under the framework of UNESCO's International Day for Universal Access to Information^a and the implementation of ITU's Arab regional initiatives.^b

The ITU-UNESCO Digital Inclusion Week promotes collaboration and raises awareness of the role of digital inclusion in sustainable socioeconomic development. In particular, it emphasizes the critical role of information and knowledge as catalysts for innovation and development and underscores the key role that information and communication technologies (ICTs) play in this process. The Digital Inclusion Week addresses barriers such as affordability, lack of digital skills, gender inequality, challenges faced by persons with disabilities, and more. It ensures that vulnerable sectors of Arab societies can participate in and benefit from the digital revolution. Ensuring that no one is left behind is central to realizing national development strategies and achieving the 2030 Sustainable Development Goals.

Achieving digital inclusion requires a range of responses to complex and evolving challenges. This requires a multisectoral approach that leverages the knowledge, networks as well as tangible and intangible resources of various actors. A range of interventions encompass issues such as skills and competencies, infrastructure, policy, projects, and finance. Recognizing the complexity of this challenge, ITU and UNESCO have been mobilizing governmental, intergovernmental, academic, private-sector and other civil-society actors within and outside the region to support the Digital Inclusion Week. These efforts are raising awareness and broadening the number of persons benefiting from digital technologies, contributing to building human capital and enabling persons to reach their potential.

Since its inception in 2017, the ITU-UNESCO Regional Digital Inclusion Week for Arab States has been celebrated in 10 Arab countries, namely Algeria, Bahrain, Egypt, Iraq, Jordan, the State of Palestine, Qatar, Saudi Arabia, the Sudan, and Tunisia. Activities organized have reflected the priorities of the national implementing partners ensuring relevance and ownership. Over 40 partner organizations from a variety of stakeholder groups have been involved.

Various governments and institutions have used the week to launch national policy processes. Fora such as international and regional conferences, TED-style talks, and webinars have enabled the sharing of research and best practices. The Digital Inclusion Week has also given attention to developing ICT solutions and supporting the development of the region's tech start-up ecosystem. In this regard, events such as innovation boot camps, design sprints and hackathons that promote innovation and respond to urgent challenges in areas such as social inclusion, education and health-service delivery have been held. Capacity-building workshops organized during the Digital Inclusion Week have developed skills in areas such as digital entrepreneurship, communication and cybersecurity. This training has benefited practitioners as well as policymakers supporting the development of human capital and strengthening institutional capabilities. Outreach and awareness-raising have been other focus area with events such as technology exhibitions that feature locally developed solutions and inclusive high-visibility run/walk events.

The Digital Inclusion Week has continued to receive positive support from a broad range of stakeholders for the attention it has given to issues in the areas of health, education and persons with disabilities. By helping to launch tech start-ups, initiating new partnerships and sharing experiences, the Digital Inclusion Week is a valuable contribution to digital inclusion and the creation of knowledge societies across the Middle east and North Africa region.

Source: Compiled by ESCWA based on information provided by ITU Arab Office and UNESCO Cairo Office.

^a See <https://unesdoc.unesco.org/ark:/48223/pf0000235297>.

^b ITU, 2018a.

B. Capacity-building in ICT for development and digital development

Everyone, including men and women, youth and elderly, should be able to acquire the skills necessary to fully benefit from the information society. This makes capacity-building in ICT for development absolutely essential. The use of ICTs helps achieve universal education worldwide, through delivery of education and training of teachers, particularly vocational and tertiary education in science, technology, engineering, and mathematics (STEM); improves conditions for lifelong learning which consider the needs of both men and women, and enable youth and people outside the formal education process to improve their professional skills; and promotes engagement in social life, political participation and social cohesion.

1. ICT in education and training (including e-learning)

ICT offers learning opportunities in the training of students and teachers, delivering information to students in an interactive manner and preparing modern learning curricula. So far, ICT as a tool for basic literacy is in use only in few countries, such as Jordan and Kuwait, through specific initiatives or schools specialized for this purpose. Adult literacy centres or schools are common in Arab countries, including some dedicated to girls, which are equipped with computer labs for use in teaching. Most Arab countries have introduced IT as a subject in their school curricula, although a large number of elementary schools do not have computer labs. School textbooks have been digitized and are available in the form of e-books in a number of countries, with the possibility

of e-learning and remote delivery of education. Initiatives have been launched in a few Arab countries, including Oman, to raise awareness on IT and digital literacy to prepare the population for the knowledge society and the digital economy; some community centres are dedicated to women. Virtual universities are few in the Arab region, and some countries do not even recognize accreditation from these universities.

Advanced comprehensive initiatives are being implemented systematically in a number of Arab countries to connect schools, digitize all learning content and processes, and train teachers on ICT tools for education. More details by country are provided in the section below.

E-learning in Iraq is carried out by designing learning packages to deliver the scientific material to the students; publishing the lectures of university professors on websites for the students to download and read; various ministries, including the Ministry of Higher Education, jointly offering modern ICT courses on the Internet; establishing e-learning centres in universities where professors design their e-lectures, which are assessed and approved by a special committee; and making the Iraqi Virtual Science Library accessible to all universities and most ministries.

Jordan took early steps in using ICT as a tool for basic literacy. One of the main projects is the Jordan Education Initiative, launched in 2003, which supports schools by implementing effective pedagogical integration of ICT tools and e-resources in education and piloting innovative educational projects, including cloud computing, 3G connectivity, one-to-one computing, and technology use in early

childhood learning. All high schools in Jordan have one or more computer labs. Approximately 1,350 elementary schools do not have a computer lab but use whiteboards. Overall, there are some 68,000 modern desktop computers in schools. The digitization of the education system continues with some pilot initiatives such as Smart Classroom Pilot; Open Education Management Information System, with support from UNESCO; Education Network (broadband provided by Umniah, Orange and NBN); Edraak, using a MOOC platform; and the Jordan Education Initiative educational model, to develop technologically-savvy schools that prepare their students to meet digital economy requirements.

In Kuwait, the Ministry of Education improved the delivery of education services to all segments of society and increased the number of channels to facilitate learning in a simple and complimentary way. For basic literacy, there are four schools with 3,576 students at the intermediate level and 8,310 students at the high level, equipped with computer labs and free Internet access. The Ministry develops and maintains its own software and applications such as the Kuwait Educational Portal, which is run and maintained by ministry staff to serve 728,000 concurrent end users, including students, mentors, teachers, school administrators, parents, and technical staff. The Ministry also designed mobile applications for both iOS and Android platforms. Currently, virtual universities are not accredited in Kuwait. However, ICT is used to allow access for students and staff members to teaching material and to digital libraries. Social media are heavily used by students and staff members for connectivity purposes, taking into consideration persons with disabilities. Students can also access the learning materials through self-learning channels such as Moodle. Online

libraries are provided for researchers so they can access the research papers of their interest.

In Mauritania, digital libraries were established in several secondary schools with all the necessary supplies, including computers, however without Internet, to be used by teachers and students for research and study purposes. Mauritania has a representative office for the African Virtual University, which offers distance courses. The modern University of Nouakchott, in collaboration with the African Virtual University, established, in 2017, a well-equipped remote-training centre, which is run by highly-trained staff. Dozens of specialized centres were established in major cities to enable citizens to optimize the use of ICTs.

In Oman, several capacity-building programmes are running successfully across the country catering for the need of different segments of the society. The National IT Training and Awareness Framework is a governmental and nation-wide initiative aimed at developing ICT skills and capabilities and increasing ICT awareness within the government and the community. The Initiative aims to provide ICT training opportunities to the citizens of Oman in order to enable them to fully participate in a digital knowledge-based society. In achieving its goals, the Initiative also contributes to Oman's transformation towards a digital society, the development of a local ICT industry and the creation of employment opportunities for the youth of Oman. It aims to deliver digital literacy training programmes to the community through the use of community knowledge centres, part of which are for women, implemented throughout the country. The Government IT Training and Certification is one of the projects under the National IT Training and Awareness Framework. In addition, there are well-designed training courses for teachers in using ICT in

their teaching process. Faculty interact with the portal on a daily basis to enter details on the absence of students, view and print class roster and register students' final marks at the end of the semester.

The use of IT to eradicate illiteracy in the State of Palestine is carried out through programmes that can be uploaded on smart phones, are spoken in Arabic and include illustrations of characters and numbers. The State of Palestine is under the process of moving from traditional education to e-learning by supporting schools with tablet devices. The Ministry of Education and Higher Education implemented several projects that contributed to the promotion of ICTs in education, including the following: the Model Schools Network Project, launched in 2007; the E-Learning in Palestinian Schools project, launched in 2010, funded by the Belgian Government and implemented in cooperation with the Palestinian Government. Internet connections are available to more than 1,000 public schools affiliated with the Education Directorate in the State of Palestine, each having one or more fully-equipped computer lab. Through this project, the Ministry has been developing an educational portal containing educational resources to help teachers in their teaching tasks. In cooperation with the private sector, the Ministry established a school portal to communicate with parents and keep them updated on their children's educational life at school, while training teachers on the effective use of e-learning. To date, there is no accreditation of distance learning or virtual universities in the State of Palestine. However, digital libraries are available and persons with disabilities can easily access the websites of universities.

In the Sudan, the National Council for Literacy and Adult Education uses computers in all its activities and an internal network connected to the Internet for emails. The basic curriculum

is taught over eight months and the supplementary curriculum over further eight months. The E-Learning Experience Project targets children outside school from age seven to nine and youth. This project is carried out in Gedaref, White Nile, Sennar, Kassala, and North Kordofan, with the devices working on solar energy for lack of electricity. There are 98 local training centres registered under the Sudanese Computer Driving Licence Programme available to all, including the disabled, who receive special care and pay reduced fees. Specialized institutions deal with people with disabilities such as the National Council for the Disabled and State-supported organizations working in this field, training them on the best use of equipment such as speaking machines for the visually impaired. Women in the Sudan benefited from ICT training and capacity-building projects organized by governmental organizations and NGOs, which include the technical literacy project for women; the computer-for-each-home project enabling women to use computers on a daily basis; and the University Information Network Project. The State encourages the education of girls by establishing schools and adult literacy schools particularly for girls and women. These schools are equipped with computer labs and computer teaching is a mandatory part of the curriculum. In 2011, the Ministry of Communications provided eight video schools for girls, offering distance education in some war-affected states which found it difficult to hire teachers in specialized scientific subjects such as chemistry, physics and biology. E-classes were conducted in the states of Kordofan, thousands of students attended, and classrooms were equipped with screens and interactive receivers to follow lectures and lessons held in Khartoum, some 1,000 km away. Problems and constraints include lack of facilities, weak supply of electricity and lack of Internet capacity in remote areas.

The Syrian government deployed great efforts in capacity-building in general, and particularly in the field of ICT, targeting all segments of society, particularly those displaced since the onset of the war. ICT supported these efforts, which included developing curricula and training teachers, raising the administrative efficiency of educational institutions and developing new tools to provide educational services for all. A number of projects was implemented using ICT to develop the pre-university educational process on two tracks. The first track relates to an educational information management system, essentially a smart-school project implemented in cooperation with UNESCO in 25 schools in Damascus. The second track relates to ICT applications in educational material, including the process of digitizing textbooks and making them available on the website of the Ministry of Education. The number of schools connected to the Internet in 2011 was approximately 2,800 out of a total of 22,000 schools, representing only approximately 13 per cent of all schools. The number of ICT teachers reached 7,750 in 2018, and the computer penetration rate in elementary schools reached one computer for 37 students, while in secondary schools, it reached one computer for 18 students. Public universities are making available all university books and lectures on the site of each university free of charge. The Syrian Virtual University was established in 2002 by Legislative Decree No. 25 to be the fourth virtual university in the world and the first in the Arab region. The university's main objectives are to provide e-services for students, academic and technical support, and facilitate Arabization and the development of scientific research. The number of students enrolled in the Virtual University in the first semester of 2018 was 8,832, the number of teachers 524, and the number of university access centres 18, with 12 outside the country. A database of post-graduate studies (master's

and PhD) was established in Syrian universities and made available on the website of the Ministry of Higher Education. Between 2013 and 2017, some 17,000 masters and doctoral dissertations were registered in addition to nearly 2,000 publications of faculty members. The Centre for Training and Lifelong Learning, an up-to-date centre within the Syrian Virtual University, is one of the most important centres that develop the skills of university students and build their capacity using distance-learning technology. In 2018, there were 189 trainees, 29 per cent of whom were women. Syrian public universities adopted a range of open-education programmes, with the number of students in open education reaching 196,434 during the academic year 2017/2018 out of which 95,316, or 48.5 per cent, were women. Internet prevalence and cost of access are the main barriers to the widespread use of ICT-based distance-learning tools, which makes the development of applications and platforms and securing the necessary funding the biggest challenges.

In Tunisia, *Madrassati* is a national platform characterized as the digital space for primary schools, developed by the National Centre for Technology in Education, which can run as a mobile application. It includes around 3,200 schools and is dedicated to school staff (directors and teachers) and to parents and students who can interact with their teachers and access multimedia resources and a virtual library. Additionally, open and free educational portals are available to provide learning resources. Within the framework of cooperation with the European Commission (Erasmus and the EU Programme), the Ministry of Education joined the eTwinning programme, which offers a platform for school staff, including teachers and schoolmasters, among others. It aims to support teachers and administrative staff of different countries to exchange and establish projects.

The school network in Tunisia includes some 5,000 educational institutions. The Tunis Virtual University, a scientific and technological public institution created in January 2002, has as its main mission to develop online courses and university programmes for Tunisian universities. Tunis Business School, established in 2010, gives courses following both traditional and online approaches. Since 2000, the Centre for Information, Training, Documentation and Studies in Communication Technologies has been providing an e-learning platform for professionals and students. Several e-content and virtual libraries are online and managed by the Ministry of Higher Education, including the university resources library and the portal of the national university centre for scientific and technical documentation. The Ministry of Higher Education has centres for career and skills certification aiming to improve the employability of students and their preparation for working life.

2. Training programmes for capacity-building in the use of ICT for development

Training programmes for ICT for development for all strata of the society are provided in most Arab countries by NGOs and by lifelong training and learning centres. More technical training is provided by specific academies such as those of Cisco and Microsoft. Training programmes are offered to civil servants by governmental training organizations, one of which is the Academy of ICT Essentials for Government Leaders in the ESCWA Region (AIGLE) aimed at senior managers. ESCWA carried out train-the-trainers sessions for experts from ESCWA member countries, and national workshops are being implemented in these countries by trained local teams.

In Iraq, the Ministry of Higher Education provides computing courses to more than 60,000 students in the freshman and sophomore years for all the faculties of sciences and humanities. The Ministry's department for research and development requires training in computing basics (international computer driving licence, Internet and computing core certification and IT skills) and attaining the relevant certificates as a prerequisite for application for higher education in Iraq. The computer centres of different universities, in addition to private-sector centres, annually offer training courses in most IT specializations and for token fees. The Computer Centre Administration at the University of Baghdad was opened four academies for the courses and programmes of Cisco, Microsoft, IBM, and Oracle, and an international examination centre.

In Kuwait, civil servants require training in basic IT literacy and system analysis and design, in addition to other courses to be future-oriented, evidence-based and innovative, while adapting to changes. Basic IT-literacy and social-media courses are available for all strata of the society, including women, youth and persons with disability, to increase their employability.

In the State of Palestine, the General Directorate for Training and Development strives towards raising the level of civil servants to the required level through advanced IT training. Special policies and mechanisms, including training on the use of IT, are needed to integrate persons with disability into society. Adult training on the use of IT includes women and the elderly and is carried out mainly through cultural centres. Disaggregated data by sex is needed to be able to understand the basic challenges facing girls and provide the necessary training.

Box 4. Promoting open educational resources in the Arab States

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has been promoting open educational resources (OERs) as part of its efforts to ensure access to quality education and to improve learning outcomes. OERs are any educational resource and material in the public domain or released under an open licence that may be freely accessed, reused, modified, and shared without the necessity of paying royalties or licensing fees, while respecting the authorship of the work.

In 2012 and 2017, UNESCO organized OER world congresses in Paris and Ljubljana, respectively, to exchange and consolidate global experiences and practices. In the lead-up to the congresses, regional consultations provided insight into the specificities of Arab States. UNESCO's member States endorsed the action plans and declarations adopted by these congresses. In the region, national OER policies were developed in Bahrain, Morocco and Oman, while other countries have reached various stages in this process.^a

To support implementation of these global action plans in the Arab States, UNESCO organized various national and regional initiatives. In 2016, a two-day capacity-building workshop on OERs attended by the Arab League Educational, Cultural and Scientific Organization (ALECSO) and representatives of 13 Arab States (Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, State of Palestine, Saudi Arabia, Sudan, and Tunisia) was held in Amman. The workshop led to the establishment of a community of practice, the Arab OER Forum, which links researchers, practitioners and policymakers.

Projects in Egypt, Jordan and the State of Palestine supported the development of OERs with a focus on policy, advocacy, capacity-building, and content production. Through UNESCO's ICT Competency Framework for Teachers (ICT-CFT), training materials for teachers were developed and contextualized for use in Algeria, Egypt, Oman, and Tunisia. These resources are available on UNESCO's ICT-CFT OER Hub.^b The OER Hub is an online repository of OER materials; the Hub promotes transregional collaboration and sharing of practices and content.

Starting in late 2015 until the end of 2017, UNESCO implemented a skills development programme for 18 higher-education institutions across Libya. The project provided Libyan stakeholders with the knowledge and skills necessary to sustainably develop and use OERs to support quality learning and teaching in Libyan institutions for higher education. Project outcomes included the following:

- A situational analysis of the use and potential of OER in the Libyan education system;
- Heightened awareness of OERs amongst decision-makers and stakeholders in governmental and higher-educational institutions;
- A critical mass of lecturers able to use OERs in their professional practice;
- The creation of a Libyan OER community of practice for lecturers in institutions for higher education.

UNESCO is currently establishing an OER chair at Notre Dame University, Louaize, Lebanon. The chair will support policymaking, training, research, and the production of OERs across the Arab world. UNESCO's OER activities have benefited from substantial cooperation with ALECSO, particularly activities in Tunisia. Other partners involved include the American University in Cairo (Egypt), Al Quds Open University (State of Palestine) and the Queen Rania Centre for ICTs in Education (Jordan).

Source: Compiled by ESCWA based on information provided by UNESCO Cairo Office.

^a Commonwealth of Learning, 2017.

^b UNESCO ICT Competency Framework for Teachers. Available at <https://www.oercommons.org/hubs/UNESCO>.

In the Sudan, the National Council for Training provides training management in various governmental and private institutions. A number of women and youth organizations provide training on the use of IT. The Sudanese licence for computer operation is required for the appointment of civil servants.

In the Syrian Arab Republic, training on ICT for development is carried out either by governmental agencies or centres operated by NGOs. AIGLE, launched by ESCWA, provides a training programme on the use of ICT for development for senior management and decision makers in government institutions, which has been implemented in a number of ministries and government agencies. So far, the number of AIGLE graduates is 135. The training modules were listed as official courses at the Higher Institute of Public Administration, and two modules were included in the master's degree curriculum awarded by the Arab Academy for E-Business. In 2010, MoCT, in collaboration with the European Union, developed a set of national ICT standards and, in 2016, launched a second phase of training, with 90 new trainees. The Indian Centre of Excellence in ICT started training activities in 2011 and is being rehabilitated and reactivated after the war as a prelude to the re-launch. The Syrian Computer Society provides training, recovery activities and training courses in all Syrian governorates, including on the international computer driving licence, programming and robotics, targeting professionals and persons with disabilities. Training programmes for youth and children are provided by the Centre for Training and Lifelong Learning at the Syrian Virtual University, to spread the ICT culture among

the new generation and deepen their knowledge according to their age and mental abilities. The number of trainees at the first level in 2018 was 136, 48 per cent of whom were girls. The number of trainees at the second level reached 90, 35 per cent of whom were girls. Robotic activities and competitions are organized by the Syrian Computer Society and Robot Club at the Higher Institute of Applied Sciences and Technology. The Syrian Arab Republic participated in the World Robot Olympiads in 2014 and 2018 with 70 teams and won advanced positions in international competitions.

In the United Arab Emirates, MOCD provides training courses for all categories of the society, including women, youth, the elderly, and persons with disabilities, and support to NGOs. The major challenge is the lack of awareness of the training courses.

Some of the most important activities in the region are related to open education. Box 4 provides highlights on UNESCO's efforts in this regard.

C. E-government, e-services and e-health

In addition to its role in supporting employment, capacity-building, education, and training covered in the previous sections, ICT thematic applications can further support social development within the framework of national e-strategies in the fields of public administration and health. This section illustrated the role of ICT applications in the areas of e-government, e-services and e-health through either back-office, web-based or mobile applications.

1. E-government programmes, institutions and strategies

The computerization of public administration in the Arab countries has been ongoing for the past three decades or more, building independent and unconnected silos. The most common areas of public administration that were computerized early in the process were the management of taxation and revenues and the processing of customs using standard systems such as the Automated System for Customs Data (ASYCUDA). However, e-government started to make its way into the region for the past decade transforming computerization in public administration into a more uniform and comprehensive system. Whenever an e-government project was implemented, it gradually covered government-to-government (G2G) and government-to-citizen (G2C) services, followed by government-to-business (G2B) services.

Table 21 provides information on the authority in charge of e-government implementation in each of the participating Arab countries, the number of e-services currently available and the number of e-services planned for the near future. Although the definition of e-services may vary from one country to the other, their number provides an indicator of the development of e-government in these countries. Thus, Kuwait was an early comer to e-government, followed by the United Arab Emirates, Jordan and Tunisia. In the Syrian Arab Republic, the war put a stop to an ambitious e-government project supported by UNDP in 2012, and so far, it has not recovered. E-government services cannot be complete without e-payment and e-procurement, and both seem to be lacking in half of the participating Arab countries.

Table 22 provides a matrix for the features of e-government strategies. Table 23 lists information and services available through the e-government portals of these countries. All portals provide general information, laws governing e-government and directories as well as static information and downloadable forms. Three countries, namely Mauritania, the State of Palestine and the Syrian Arab Republic, do not offer interactive services. Table 24 indicates that at least three countries do not have e-payment, citizen participation is rather limited, and the most common social media platform used by e-government portals is Facebook. Table 25 indicates that support for smartphones and tablets is available for most portals, but not necessarily using dedicated applications. More details are provided below regarding e-government implementation in these countries based on the NDDRs. It should be noted that a more complete analysis will be conducted by UNDESA on e-government worldwide at a later stage.

In Iraq, Decree No. 45 of 2016 established e-government under the control and supervision of the Higher Committee of Coordination and Management of Government Activity, which sets standards for the ICT sector and prepares a realistic national plan that contributes towards digital transformation and coordination between ministries and governmental agencies. This committee consists of a number of teams, namely an infrastructure team, applications and e-services team and policy and legal framework team. The latter is working on editing three draft laws, which are the e-government law, personal data protection law and the law on the protection of telecommunications and information infrastructure.

Most governmental entities in Jordan adopted computerized internal systems to automate the

workflow and provide citizens with standardized governmental services. Jordan Customs is considered a pioneer in the field of digital transformation delivering and launching most of its services electronically. Similarly, taxation and revenues management systems were computerized, and all Government information digitized. All citizens are engaged through e-services, including

a payment gateway (e-Fawateercom). G2G, G2C and G2B services are available (239 e-services by April 2019), and 23 per cent of e-government websites support persons with disabilities. In late 2017, e-procurement was launched by the General Supply Department to provide an automated system to apply for governmental tenders and submit technical proposals.

Table 21. E-government entities and services

Country	Name of authority in charge of ICT in public administrations	Name of e-government authority	Number of implemented governmental e-services	Number of planned governmental e-services
Iraq	General Secretariat of the Council of Ministers http://cabinet.iq/	General Secretariat of the Council of Ministers http://cabinet.iq/		15-20
Jordan	Ministry of Digital Economy and Entrepreneurship (formerly known as Ministry of ICT) www.moict.gov.jo	E-Government of Jordan www.Jordan.gov.jo	239 e-services as of April 2019	157 e-services from May 2019 till the end of 2020
Kuwait	Council of Ministers General Secretariat www.cmgs.gov.kw	Central Agency for Information Technology www.cait.gov.kw	950 e-services provided by 49 agencies 993 content informative services by 49 agencies	337 planned e-services for 2019/2020
Mauritania	Ministry of Higher Education, Scientific Research and Information and Communications Technology www.mesrstic.mr	General Directorate of Information and Communications Technology	Offers many services via the websites of the public sector	Five subsystems: <ul style="list-style-type: none"> • Administrative correspondence; • University registration; • Higher education; • Educational open portal; • Certificate validation

Country	Name of authority in charge of ICT in public administrations	Name of e-government authority	Number of implemented governmental e-services	Number of planned governmental e-services
Oman	Information Technology Authority (currently Ministry of Technology and Communications) Arabic ita.gov.om	Information Technology Authority (currently Ministry of Technology and Communications) www.ita.gov.om	300	785
State of Palestine	Ministry of Telecommunications and Information Technology www.mtit.pna.ps	General Directorate of E-Government www.mtit.pna.ps	38 services under process	Implementing mobile application (iOS or Android-based) contains 10 inquiry e-services
Sudan	...	...	316	...
Syrian Arab Republic	Ministry of Communication and Technology www.moct.gov.sy	Ministry of Communication and Technology www.moct.gov.sy	...	...
Tunisia	Ministry of Communication Technologies and Digital Economy https://www.mtcen.gov.tn/	E-Government Unit http://www.tunisie.gov.tn/	397	Each ministry and public enterprise is planning two to three new services
United Arab Emirates	Telecommunications Regulatory Authority www.tra.gov.ae	Telecommunications Regulatory Authority www.tra.gov.ae	289	Each entity has its own yearly planned e-services as per their strategic e-transformation plan

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: "..." indicates having no information.

In Kuwait, the digital transformation projects, including the e-government project, are part of the ICT strategy under preparation for CITRA. G2G components provide needed interaction

between governmental entities as well as between local and central governments. Currently, 83 government agencies are part of the e-government project, which constitutes

91 per cent of the total number of government agencies in Kuwait. The G2C component is implemented through a portal run by CAIT.⁵⁹ The G2B component is also implemented by CAIT, which has completed a framework for the participation of private-sector companies and corporations in the field of consultation and implementation of IT projects in the country in alignment with the 2035 vision to implement SDGs.

The Mauritanian administration has been digitized and refined, enhancing the quality of service provided. This includes the establishment of a biometric civil status with digital registration and the issuance of digital civil documents. All government agencies have access to electronic sites facilitating access to information and reducing the necessary steps for administrative procedures. Mauritania Customs use ASYCUDA for their procedures. A system was established for the management and follow-up of taxation and another one for the digitization of documents, such as a document archiving system for State employees. E-government subsystems include an e-procurement system to present tenders on the websites of the concerned authorities; interaction between governmental agencies (G2G) with e-correspondence; a public expenditure implementation system; G2C interaction and delivery; interaction between local government, central government and businesses (G2B); and an integrated tax management and tracking system.

The Omani E-Government Transformation Plan aims at accomplishing the full e-transformation in government services and transactions to assure a sustainable knowledgeable society and economy while enhancing the quality of government services and their delivery as per certain regulations,

standards and timing stages simplifying the procedures for citizens, companies and government entities. Since June 2012 and the digitization of government services, the quality of existing e-services provided to the public has improved and 300 e-government services were launched. The National e-Payment Gateway provides an operational component of the e-governance infrastructure and full e-commerce facilities that allow secure online payments. The e-tendering initiative is based on a centralized tender management system and processes, achieving higher efficiency and increasing transparency and accuracy in government tendering processes with considerable cost savings. More than 55 governmental entities are currently using the e-tendering system.

In the State of Palestine, most ministries are computerized, including taxation, to provide better services to citizens. G2G services between 21 ministries as well as between local and central governments exist. Delivery models and government portals (G2C) are available, providing 10 services to citizens. G2B interaction between local and central governments and the commercial business sector is also functional. X-Road is the platform used to facilitate the exchange of data between the databases and information systems of the different government institutions through a secure channel. Currently, the system is hosted at the Government Computer Centre located at and operated by MTIT.

In the Sudan, all 21 federal ministries and 200 government units use computerized administrative and financial systems. The ASYCUDA system is in use by the Sudanese customs in all its locations, portals and ports, and the computerization of tax and revenue

management systems was developed. All national documents are being digitized by the National Documents Library using a number of programmes. E-government services are available, including G2G components linking government entities (101 e-services), G2C components dealing with citizens (215 e-services) and G2B components linking local and central government with businesses. However, no special procedures are followed to facilitate the use of e-government services for persons with disabilities.

The computerization of public administration in the Syrian Arab Republic is still in its early stages and varies from one government agency to another, taking the form of islands that are spaced and unconnected. The national system of e-government transactions is a central national system operating at the government level that includes three main components, namely the work procedures management system, the document management and archiving system and a central messaging system. The Ministry of Interior implemented a number of computerization projects, including the following: the civil registry which was digitized, and a unique national number was generated for all Syrian citizens; the Civil Affairs Portal, through which civil registration services are provided in all governorates and citizen service centres; the Immigration and Passports Department for travel procedures, passport issuing and residency system; traffic management, including the system of traffic violations and of issuing driver's licences; and the Criminal Security Department, including the automation of the judicial record and the provision of services through citizen service centres. The Ministry of Transportation developed a central programme through which all transactions on vehicles go through private service centres. The Ministry of Justice

computerized judicial work in Damascus and the countryside. Work is being carried out in cooperation with the Higher Institute for Applied Science and Technology to develop an application to calculate the real estate sales tax by using GISs to determine the location of the property and its specifications, and then calculate the actual tax. The digitization of the basic government records has reach various stages, some were digitized, and a central database was built.

In Tunisia, the number of e-government services reached 397 in 2019, including 17 G2G services, 289 G2C services and 91 G2B services. E-government services are still to be improved, but they are expected to undergo a quantum leap since currently the Ministry of Communication Technologies is implementing the national interoperability platform that will provide G2G information so that citizen will no longer be asked for any information and documents that the government, as a unique body, already has. The Elissa governmental application was implemented in seven pilot ministries and is expected to cover all ministries by the end of 2019. Elissa is a collaborative application that supports e-document management and transfer between all administrative departments. An e-procurement platform established in 2013 aims to enhance transparency, equality and efficiency by introducing online public procurement services. It is expected to have an important impact at the national level due to increased transparency, fairness and efficiency of work, and enhance industrial competitiveness in addition to establishing international standards. It is worth mentioning that all ministries and public institutions have ongoing projects to develop new online services.

The Government of the United Arab Emirates underwent the big challenge to move the public

from using manual services to online services. By simplifying e-services, governmental departments reached the public through marketing, gamification, and customer support

all around the clock. In 2015, the country achieved the remarkable rate of mobile governance of 96.3 per cent of the 337 most important governmental services.

Table 22. Features of e-government strategies

Features of e-government strategy	Country									
	Iraq	Jordan	Kuwait	Mauritania	Oman	State of Palestine	Sudan	Syrian Arab Republic	Tunis	United Arab Emirates
1. Has an implementation plan	X	X	X	X	X	X	X	X	X	X
2. Aligned with the national development strategy	X	X		X	X	X	X	X	X	X
3. Aligned with the SDGs		X		X	X	X	X	X	X	X
4. Aligned with digital development strategy		X		X	X		X	X	X	X
5. Has emphasis on digital-first principle	X			X	X		X		X	X
6. Has emphasis on digital by default, by design and mobile-first principles		X		X	X				X	X
7. Has emphasis on once-only (data) principle				X	X			X	X	X
8. Has emphasis on 'leave no one offline' or 'leave no one behind'; or other measures to ensure e-government is accessible to most vulnerable groups ^a	X	X		X	X		X	X	X	X
9. Makes specific reference to e-participation, digital inclusion and/or engagement		X		X	X		X	X	X	X
10. Makes specific reference to the use of social media in the government		X		X	X		X		X	X
11. Makes specific reference to the use of new technologies such as artificial intelligence, blockchain and big data		X		X	X				X	X

Source: Compiled by ESCWA from the National Digital Development Reviews 2019 component related to the UNDESA 2020 Member States Questionnaire.

^a These groups include the poor, immigrants, older persons, persons with disabilities, women, youth, and indigenous people.

Table 23. Services available on e-government portals (*Part A*)

Country	URL of e-government portal	Information			Services		
		General	Laws	Directories	Static info	Downloadable forms	Interactive
Iraq	http://www.egs.iq	Yes	Yes	Yes	Yes	Yes	Yes
Jordan	http://www.Jordan.gov.jo	Yes	Yes	Yes	Yes	Yes	Yes
Kuwait	https://www.e.gov.kw	Yes	Yes	Yes	Yes	Yes	Yes
Mauritania	http://www.bewaba.mr	Yes	Yes	Yes	...	...	No
Oman	http://www.oman.om	Yes	Yes	...	Yes	Yes	Yes
State of Palestine	http://www.palestine.ps	Yes	Yes	Yes	Yes	Yes	No
Sudan	http://www.esudan.gov.sd	Yes	Yes	Yes	Yes	Yes	Yes
Syrian Arab Republic	http://www.egov.sy	Yes	Yes	Yes	Yes	Yes	No
Tunisia	http://www.tunisie.gov.tn/	Yes	Yes ^a	Yes	Yes	Yes	...
United Arab Emirates	https://www.government.ae	Yes	Yes	Yes	Yes	...	...

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: "..." indicates having no information.

^a See www.legislation.tn.

The country's transition from e-government to m-government reveals that the biggest 41 governmental departments succeeded in achieving the shift to m-services within 730 days, and the most important change taking place over the past few years was the change of mentality and the culture of governmental services. Today, delivery of services no longer relies on buildings and thousands of employees, but on advanced systems and innovative minds. At present, the transformation rate is at 98.18 per cent. Almost 80 per cent of the old data was digitalized and is available in different machine-readable format. For the first time in the history

of the United Arab Emirates, the Government applied the concept of crowdsourcing to enhance the content of the federal portal Government.ae. The campaign was started in June 2018 and, by the end of November 2018, 124 topics were added to the portal based on customer requirements. The total number of G2G services is around 367, with 90 services classified as priority services, and 80 per cent of the services are online with an adoption rate of 90 per cent. In the same context, Smart Dubai announced its strategy to provide all e-government services through blockchain technology by 2021. There are different national projects which bring all

these services together under one umbrella. All federal governments and most local governments have participated in projects such as FedNet, Smart Pass and the Government Service Bus. The total number of G2C services is approximately 1,527, with 292 services classified as priority services, 97 per cent of services are online and the adoption rate is at 71 per cent. Every government has its own portal, and there are 39 federal portals. The total number of G2B services is approximately 1,331, 164 services

classified as priority services. The country announced the launch of the first phase of the *Bashr* initiative, one of the most important strategic initiatives implemented and developed through close and constructive cooperation with all local and federal governmental departments and entities involved in licensing economic activities. This initiative aims to promote competitiveness in doing business by allowing to start a business in simple and quick steps in no more than 15 minutes.

Table 24. Services available on e-government portals (*Part B*)

Country	E-payment	Online account	Bilingual	Citizen participation		Social media				
				Blogs	Polls	Facebook	Twitter	LinkedIn	YouTube	Other
Iraq	No	No	AR	Yes	Yes	No	No	No	No	...
Jordan	Yes	Yes	AR, EN	Yes	Yes	Yes	Yes	Yes	Yes	...
Kuwait	Yes	Yes	AR, EN	No	Yes	Yes	Yes	No	Yes	Instagram
Mauritania	...	...	AR, FR	...	...	Yes	...	...	...	...
Oman	...	...	yes	Yes	...	Yes	Yes	Yes	Yes	Instagram
State of Palestine	No	Yes	AR	No	No	No	No	No	No	No
Sudan	Yes	Yes	AR, EN	No	No	Yes	Yes	No	Yes	...
Syrian Arab Republic	No	No	AR, EN	No	Yes	Yes	No	No	No	...
Tunisia	...	Yes	AR, FR	No	Yes	Yes	No	No	Yes	No
United Arab Emirates	...	...	AR, EN	Yes	Yes	Yes	Yes	Yes	Yes	Instagram

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: "..." indicates having no information.

Table 25. Services available on e-government portals (*Part C*)

Country	Additional services			Mobile versions		Other features
	RSS ^a	Web statistics	Search	Support for smartphones/tablets	Dedicated App (iOS or Android based)	
Iraq	No	No	Yes	No	No	...
Jordan	Yes	Yes	Yes	Yes	Yes	Location-based services, rich collaboration tools, advanced search capabilities, open data platform (<i>Daleel</i>)
Kuwait	Yes	Yes	Yes	Yes	Yes	Read speaker (text-to-speech synthesis)
Mauritania	Yes	...	...	Yes	No	One gate to access everything
Oman	Yes	Yes	...	...	...	...
State of Palestine	Yes	Yes	Yes	Yes	Yes	No
Sudan	No	Yes	Yes	Yes	No	...
Syrian Arab Republic	Yes	No	Yes	Yes	No	...
Tunisia	No	No	Yes	Yes	No	...
United Arab Emirates	Yes	Yes	Yes	Yes	...	...

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: "..." indicates having no information.

^a RSS stands for Really Simple Syndication.

2. E-services usage and satisfaction

According to the UNDESA 2020 member States questionnaire, countries collect statistics on the usage of e-government services and customer satisfaction and publish the results online. These statistics are collected in Jordan, Oman, the Sudan, the Syrian Arab Republic, Tunisia, and the United Arab Emirates, and get published online in some countries.

In Jordan, the ministries collect statistics on user satisfaction from e-government services

and publish the statistics on their websites. The Ministry of Information and Communications Technologies publishes these statistics as reports on usage and satisfaction.⁶⁰ Other governmental entities that publish these statistics are the Ministry of Education⁶¹ and the Amman municipality.⁶²

In Oman, ITA (currently the Ministry of Technology and Communications) conducts a survey aimed at measuring awareness and use of e-government services, which is used to identify challenges of use. Ministries track the

use of online services with dashboards and publish the results online. Surveys also assess user satisfaction of e-services provided by various government entities and in different locations, for example the services related to the police, employment, health, commerce, and industry. Examples include the e-health portal usage report,⁶³ and results of the survey available through the ITA portal⁶⁴ and the open data portal.⁶⁵

In Tunisia, a biennial survey is conducted to measure satisfaction of people from e-government services and the results get published on the government portal;⁶⁶ and an audit mission evaluates the e-services and survey results to recommend enhancements. A barometer of online services is under development to measure user satisfaction regarding e-services.

In the United Arab Emirates, statistics on the use of digital government services, happiness and satisfaction get collected and published online.⁶⁷ A happiness and well-being index was developed to support the country in reaching one of the top five happy countries worldwide by 2021. The progress in the use of digital services is assessed, and efforts are made to simplify their use. In 2018, the usage of e-government services reached 74 per cent, and digital services happiness reached 83 per cent.

In the same context, it is worth mentioning ESCWA's efforts in measuring maturity of e-services in the Arab countries and user satisfaction through its initiative called Government Electronic and Mobile Services (GEMS) Maturity Index. The GEMS indicator aims to measure the maturity of governmental services provided through the portal and through mobile applications in the Arab region. It seeks to

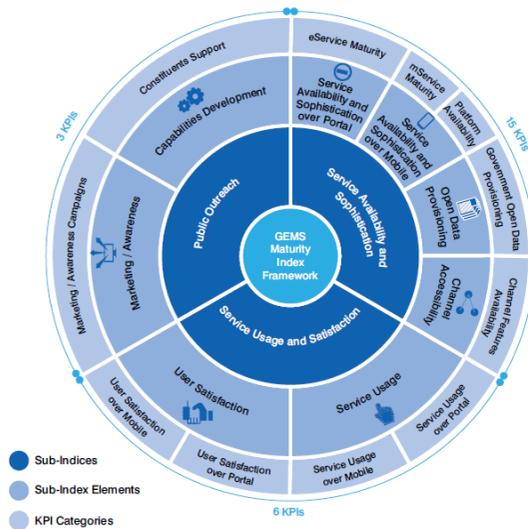
bridge the gap in most of the international indicators, related to service maturity, its use and user satisfaction. To this end, 84 government services were identified, and it is advisable for each country to deliver them electronically to individuals and businesses. The principle of life cycle was adopted in service selection. Any individual needs these services at different stages of life, and each company requires them from its establishment to its closure.

This index can be considered as a tool for policymakers to assess the progress achieved at the national level in the area of digital transformation. Therefore, it contributes to supporting national programmes and initiatives related to the achievement of SDGs 16 and 17.

In 2018, ESCWA assessed this indicator in 12 member States and will report its findings in the fourth quarter of 2019. In addition to the evaluation results, this report includes policies that could be followed up to foster the digital transformation of these public services and make them available through digital channels (portals and mobile apps). The main messages of GEMS Index for 2019 are the following:

- The importance of enhancing the public outreach of e-services, including focusing on marketing and awareness campaigns, strengthening capacities to ensure the individual use of services, and providing appropriate support tools to individuals to facilitate the use of e-services;
- Mobile government applications for m-government services are still not widespread in the Arab region;
- User satisfaction with e-government services is still limited, whether these services are provided through the portal or via mobile platforms.

Figure 2. GEMS Maturity Index Framework



Source: ESCWA, 2014.

The GEMS Maturity Index is measured across three sub-indices (figure 2), namely service availability and sophistication, service usage and satisfaction and public outreach.

3. E-health

Practically all participating countries have access to the world's medical knowledge, particularly through the Hinari Access to Research for Health Programme of the World Health Organization (WHO) or the Oxford Concise Medical Dictionary. The ministries of health provide, on their websites, awareness-raising information about public health issues for men, women and children, including sexual and reproductive health. Hospital management systems are quite common, although networks linking hospitals and health centres are still lacking. Pharmaceutical management systems and digital medical records are accessible through national databases by health institutions in some

countries. Teleconferencing and telemedicine exists, but is not common, for the purpose of diagnoses and remote health care in hospitals located in disadvantaged areas, where advanced expertise is not always available. ICT tools are also used for tracking and monitoring cases of communicable diseases to limit their spreading, including early warning systems. More advanced patient follow-up digital systems and portals exist in GCC countries to make sure patients are taking the proper medication and their health issues are under control. More details are provided below on a country-by-country basis.

In Iraq, an e-health strategy was adopted by the Ministry of Health that integrates the following systems: a health information system; smart cards carrying patients' numbers and their main medical information; electronic medical records and electronic health records; and e-pharmacy. The visitor should help the health centres to identify health problems that are spread within the geographical area of the centre and to study their health status, economic and social structure, population structure, and access to services. This allows the identification of the sources of disease, methods of infection and the size of problems, arrange them according to priorities and develop solutions to combat and control them. The strategy also takes into account the schedule of family vaccines, requirements for a specific diet, maternal and childcare, psychological care, oral and dental health, basic immunizations, school health services, and much more.

In Jordan, the Ministry of Health provides an online statistical report for all health sectors in the country, websites of all the directorates and hospitals and planning tools for health

resources. The website of the health map provides the distribution of all sites of health centres and hospitals. Remote health care is available in three hospitals, namely the Queen Rania Wadi Mousa Hospital, Government Mafraq Hospital and Prince Hamza Hospital. The computerization of 20 hospitals and 151 health centres was completed through the *Hakeem* national health programme, as well as the maintenance of the patients' digital records. The Ministry of Health established an interactive electronic reporting system for diseases in hospitals and health centres.

Kuwait has a complex health information system, providing vital health statistics for primary, secondary and specialized care. The Ministry of Health launched many e-services online, some of which cover hospital and clinic appointments, vaccination history, health insurance service for expatriates, licences application for medical professionals, and premarital medical examination. The patient care management system, digital record-keeping system and databases for national health care are in an advanced stage and fully implemented, while the pharmaceutical management system is fully implemented but at an intermediate stage of maturity. A portal reaches out to all the people in Kuwait for providing any alert, while monitoring and controlling the spread of communicable diseases and providing medical and humanitarian assistance in cases of disasters and emergencies. Furthermore, information on outbreak and control of any emergencies is handled by social media and text-message services for the entire population of Kuwait.

Some Mauritanian medical institutions, including the national hospital and the public-health school in Nouakchott, benefit from access to the Hinari and GIFT libraries.

Telemedicine is used for remote diagnosis, dissemination of relevant information to stakeholders in the health sector, distance education at home and abroad, teleradiology and teletraining, as well as transmission of health information. The surveillance and early warning system is still handled using classical tools. Efforts have been made to follow up on epidemiological information and surveillance on the District Health Information Software 2 (DHIS2) but without results so far. Mauritania also established an emergency health-operations centre, but as a result of the lack of financial resources, it has not yet been able to deal with emergencies.

The Ministry of Health in Oman launched its e-health initiative to build an interoperable health IT ecosystem for the entire nation to become a platform for the sharing of health-care data among multiple stakeholders. The E-Health Portal, launched in 2015, hosts an electronic health education library that includes pamphlets and videos on various health issues, in Arabic and English. The Ajyal project is an integral component of the e-health initiative for building a nation-wide registry of all births and deaths reported to health-care facilities, which can be securely shared between different stakeholders. The project scope includes the entire paradigm of the birth and death certification process interconnecting health institutions and the national registration system of the Royal Oman Police and the automation of the workflow involved.

In the State of Palestine, some licensed research databases, such as Hinari, are offered to the care providers, researchers and decision makers. There are several electronic systems and applications used by hospitals and primary health-care settings for health-care management, including the Avicenna health

application and DHIS2. Several health services and procedures are totally digitized, including pharmacy, laboratory, patient records, and more. Currently, the Ministry of Health, in cooperation with the Palestinian National Institute of Public Health, is developing case-based surveillance to track and monitor communicable diseases. The hospital information system implemented in 12 public hospitals is totally digitized and runs 24 hours a day, with more than 1.5 million unique records included in the system. A mother-and-child care electronic registry is implemented in more than 160 clinics and expected to cover all clinics scattered in the West Bank and Gaza by the end of 2019.

In the Sudan, a number of related health-promotion projects are being implemented, such as the m-diabetes and m-cervical projects, aimed at raising awareness and enhancing the health of citizens through access to medical knowledge and health education. A project to reduce maternal mortality aims to raise awareness among pregnant women and to clarify how to deal with all stages of pregnancy. A telemedicine project was implemented in some states, and a teleradiology project is under implementation. Hospital management and pharmaceutical management systems are also being implemented. The Health Insurance Authority, the governmental body that provides State-supported health insurance services, runs a unified database, covering more than 60 per cent of families. DHIS2 was implemented in 18 states to monitor health services and detect emergencies early. All the states of the Sudan were linked to an integrated network of televised conferences to exchange information and experiences. A family medicine project which provides some 120 health centres located in villages across the country linked with the help of ICTs significantly reduced the frequency of visiting large hospitals. A teleconference

service allows the transfer of expertise, raising the capacity of medical personnel while providing distance health care to citizens in a number of states.

In the Syrian Arab Republic, a range of medical information is available on the website of the Ministry of Health, consisting mainly of awareness lectures on health. The National Reproductive Health Programme, jointly implemented by the Syrian Ministry of Health and WHO, targets women and families, and focuses on the provision of therapeutic services through health centres spread throughout the country and cooperation with civil society to raise awareness and improve a healthy lifestyle. The Ministry of Health and some hospitals introduced electronic medical records on a trial basis with the aim to establish the appropriate infrastructure and identify all requirements needed for the introduction of such records in all hospitals. The Ministry of Health is building national electronic records for health-service providers, including both individuals and institutions. A primary care information system dealing with primary services provided by health centres was developed. The WHO Early Warning, Alert and Response System (EWARS) was introduced in 2012 and is primarily intended to detect and respond to outbreaks of contagious diseases.

In Tunisia, information systems for patient care management, digital record keeping, pharmaceutical management, and other related health applications are implemented and functional in pilot hospitals. The National Centre of Public Health is managing these national health databases and applications.⁶⁸

In the United Arab Emirates, relevant content of the world's medical knowledge is made available through online health awareness

resources at the Ministry of Health and Prevention (MOHAP), MOHAP social media channels and education materials for patients at primary health-care centres. National programmes addressing sexual and reproductive health include maternal and child health programmes, a premarital literacy kit, a healthy-pregnancy kit, and social media awareness for certain issues such as HIV/AIDS screening. The concept of telemedicine is in place, and there is a plan to pilot a telemedicine-enabled disease management programme. Two MOHAP hospitals reached level 6 of the Chicago-based Health-care Information and Management Systems Society, and the roll-out of others is planned. MOHAP implemented the Wareed health information system, which includes most of the clinical and ancillary solutions for patient care. Patients' records are accessible across MOHAP facilities, and all information is saved in data centres. Patients' information is also available through a patient portal platform. PharmNet is a portal within Wareed that manages the administration, dispensing and reconciliation of medication and points of care. Entering data in such a central portal eliminates duplication and increases patient safety and care-team communication. Furthermore, MOHAP and the Ministry of Information jointly worked on a controlled drug platform to manage and monitor controlled medications, semi-controlled medications and narcotics across the seven emirates. The Unified Controlled Medication Platform will have the flexibility to adapt and integrate with all the existing electronic applications, such as Cerner and Epic, used by medical bodies across the country, allowing for a high adoption rate by institutions. The MOHAP Health Information System is used as a database for other health-care organizations in the United Arab Emirates.

D. Towards enhancing digital transformation and social development – related policies

The information and analyses in cluster 4 show that the current situation in several Arab countries as far as digital transformation and social inclusion are concerned can be improved as follows:

- Expanding access/knowledge centres to cover most remote and disadvantaged areas and to provide e-services and training, particularly in non-GCC countries;
- Reducing the cost of broadband connectivity from home in order to increase affordability for low-income families in non-GCC countries;
- Creating and expanding lifelong learning and training centres focused on ICT and advanced tools;
- Establishing virtual schools and universities to facilitate studies for youth in remote areas, while providing high-quality education;
- Providing modern learning curricula in schools using e-books, with ICT as a subject and as a tool for e-learning;
- Digitizing academic content in schools and universities;
- Expanding e-government services to become interactive, including e-payment and e-procurement with the possible use of social media and applications for smartphones and tablets;
- Developing an interoperability framework;

- Developing national cloud-based data;
 - Digitizing main national registers;
 - Encouraging governments to develop mobile applications to deliver public services;
- Formulating an e-health strategy, which should include networked hospital management systems and pharmaceutical management systems, as well as telemedicine and follow-up digital systems.

Cluster 5: Culture and Media

This cluster directly relates to WSIS action line 8, on cultural diversity and identity, linguistic diversity and local content, and action line 9, on media (annex 1 includes the topics covered by the WSIS action lines).

A. Cultural identity and linguistic diversity

Cultural and linguistic diversity is essential in the development of the information society. Digital content, particularly on the Internet, preserves the language, facilitates its evolution and promotes cultural diversity while sustaining socioeconomic development. In addition, digital content development can play a major role in preserving the national heritage.

The Arab region has an extremely rich cultural heritage and encompasses a variety of languages that need to be captured online through digitization of documents and open public libraries. Electronic databases of books and manuscripts and national digitized archives are being built to facilitate the search for documents. Web portals were built for historical manuscripts and museum artefacts. In several countries, radio and television programmes are being converted into an e-library, accessible online. Centres of historical documentation were created, and two- or three-dimensional documentation of historical buildings was produced using

high-quality digital photography for the purpose of preservation or restoration. In a number of countries, sound heritage is being preserved through e-platforms and websites to increase social awareness and promote cultural activities. However, given the high cost of all these systems, many Arab countries are building them slowly and may stop their development altogether in times of crisis or economic difficulty. More details are provided country by country in this section.

Iraq has one of the most multicultural societies in the Arab region. A broad diversity of religions, races and cultures flourished in Iraq, united by common heritage, culture and traditions. Significant numbers of distinct communities continue to exist. Although Iraqis generally are religious and conservative, there are strong secular tendencies in the country. The Iraqi population includes a number of ethnic groups with an Arab majority, comprising Kurds, Turkmens, Assyrians, and Armenians. Although the official language of Iraq is Arabic, many other languages are spoken by a variety of ethnic groups, most notably Kurdish. Many markets reflect local culture and economy such as the famous *Al-Safafer* market in Baghdad, which is one of the oldest markets in the city, was established during the Abbasid Caliphate and remains famous for copper collectables and exhibits.

The National Library of Jordan is Amman's main public library and the governmental centre

for processing its documents for archiving purposes.⁶⁹ The Library has a selection of government documents, dating from the country's independence until the late 1980s, which are accessible online. Law No. 47 of 2007 guarantees the right to access information and forms an information council with members selected from different ministries and national councils.

In Kuwait, the Ministry of Information is considered the official body of the State in the monitoring and dissemination of information. It provides programmes that enhance the status of women and highlight their leading role in the development of society and the construction of the country's identity.

In Mauritania, cultural and linguistic diversity and respect for identity, traditions, culture, and religions are essential for the development of the information society. Digital content development nurtures cultural diversity, preserves national heritage, including languages, and promotes socioeconomic development. The Mauritanian Institute for Research and Training in Heritage and Culture provides organization, coordination and promotion of scientific research in the fields of heritage and performing arts. ICT is being used to contribute to the achievement of these objectives. The Institute has an electronic database of more than 11,300 Mauritanian manuscripts. An electronic database was built for oral narrative recordings on customs, traditions, professions, history, and more. A national library dating back to 1962 is in charge of the acquisition and preservation of all national and printed intellectual productions and the sources of written civilization. In order to benefit from IT and to facilitate the search for books, the content of this library is available on a database.

Oman is ensuring cultural and linguistic diversity through adopting a holistic approach towards digital content development and preserving the national heritage. The ITA (currently the Ministry of Technology and Communications) adopted a website and data hosting policy, established through Circular No. 6/2018, requesting all government agencies to build at least bilingual websites, in Arabic and English. The National Records and Archives Authority (NRAA) has two major electronic restoration systems, started in 2013, namely the Archive Management System, which complies with international standards for preservation of digital records, including keeping a copy of electronic records in different places; and the Electronic Documents and Records Management System that helps in managing governmental records in accordance with NRAA rulings to protect electronic records. Digitally archived documents are accessible upon request through the NRAA website.⁷⁰ The Ministry of Culture and Heritage is working on electronic preservation methods including an electronic portal for manuscripts. It is currently developing a manuscript site in agreement with Omantel to be offered free of charge to the public from inside and outside the country. At present, the site contains 4,000 digitized historical manuscripts, and more digitized manuscripts are continuously added.

The Palestinian Museum in the West Bank town of Birzeit announced, in February 2019, that the digital archive project, the largest and first of its kind in the State of Palestine, will be operational for three years, with \$1.9 million provided by the Arcadia Fund. The project aims to collect the largest number of documents and images covering daily life, personal lives, official documents, official agreements, and artistic and literary works for electronic preservation as a documentation of the social, political and cultural

life in the State of Palestine. The theme of cultural identity is one of the most recent topics that have attracted ICT researchers and scientists, especially in the light of contemporary changes in the world, with the virtual world emerging as a key partner in creating a networked society.

The Sudanese National Archives were moved to a new building designed according to the latest international technical specifications with technical and scientific features to guarantee the accurate and secure preservation of information. The National Authority for Radio and Television converted its e-library, which was founded in the 1960s, into a digital library. The National Museum is being digitized and included in databases, and a quarter of the radio archive has been digitized.

The Syrian Ministry of Culture deployed great efforts to digitize cultural content and develop a national digital archive that includes information on the national heritage and culture in various forms. Historical documents, including Ottoman documents, were moved to a secure location during the war, and digital copies are now available in the Centre of Historical Documents, which contains thousands of archived historical documents, including legal documents, court records and more. In collaboration with UNESCO within the ICONIM project, three-dimensional documentations of the *Qala'at al-Hosn* citadel (*Krak des chevaliers*) and such important buildings as the *Umayyad* Mosque and *Al Azem* Palace were recorded. The archive of historical buildings contains some 70,000 historical documents that date back to 1923, including pictures, manuscripts, correspondence, and notes. During the war, each piece of the museum was photographed, whether it was exhibited or preserved, and the number of photographs reached more than 100,000. Some 5,000 high-quality

digital photographs of the 14,000 artefacts in the museum in Aleppo were collected in a database. Many other manuscripts and old libraries were also digitized or are in the process of digitization, for preservation or restoration.

The Tunisian Government, through various institutions under the supervision of the Ministry of Cultural Affairs, is working to preserve the Tunisian cultural heritage. An electronic platform labelled Cultural Agenda was established.⁷¹ The Centre for Arab and Mediterranean Music, *Ennejma Ezzahra*, established an electronic portal for the national sound archives to collect, process, preserve, restore, enhance, and disseminate the entire Tunisian phonographic heritage. Other historical institutions use ICT to promote the national heritage such as the Agency for the Development of National Heritage and Cultural Promotion, which centralizes all information related to monuments, museums and archaeological sites in an e-platform.⁷² The National Heritage Institute is in charge of preserving and restoring archaeological sites and historic monuments, while providing, via its electronic platform, all information and details related to these sites.⁷³ These digital sites increase the social awareness and promote cultural activities at the national and local levels creating an economic dynamic for the country.

B. Media policy

The media sector and its diverse forms are part of the digital world that encompasses all sectors of the economy. Media systems play an essential role in the development of the information society and are recognized as an important contributor to freedom of the press and plurality of information.

1. Media diversity, independence and pluralism

The media landscape in the Arab region is diverse with governmental control in some countries and complete independence in others. Digital media increased the sources and variety of information and lessened governmental control. Table 26 and table 27 provide a summary of various forms of media and their numbers, which have been on the increase in the past few years. Gender-disaggregated data, where available, show that men still dominate leadership in media companies. More details are provided in the following paragraphs country by country.

The Iraqi Communications and Media Commission was established under Law No. 65 of 2004 to regulate this domain, including issuing licences to television and radio stations, and maintaining supervision and follow-up of these stations to ensure that they respect the national law and international treaties.

The Jordanian media landscape is diverse in terms of ownership, some media are public, others private and a few have shared ownership. In the newspaper sector, the State is the main contributor to three out of seven daily newspapers. The Jordanian private sector owns 15 licensed channels and 24 local radio stations. For the sake of maintaining freedom of speech and to avoid any governmental control over the media sector, no governmental support is extended to any private media institutions and reporters. Studies show that there is a gender gap in the media in the public and private sectors, including print, electronic, audio, and video material, with women working

in the media not exceeding 23 per cent. Men dominate leadership and editorial positions, but many women were able to acquire a distinguished presence as media figures and editors in the printed and spoken media.

The media in Mauritania are characterized by their diversity and the ease of obtaining licences. A list of conditions must be agreed upon by radio and television channels to ensure the diversity of content. The State provides annual support to the independent media through a national fund. Mauritanian legislation guarantees freedom of expression, provides an appropriate legislative framework for the exercise of the press and guarantees a multiplicity of opinions. Women exercise their right to media practice and 32 per cent of journalists are women; however, only 12 per cent of editors are women.

In Oman, the media sector, with its various and diverse forms, contributes to freedom and plurality of information. The official source of news is the Oman News Agency. The Ministry of Information, through the adopted policies in its espousal of the digital age, has multiple objectives and seeks to be a trustworthy source of information. There are several laws regulating the media sectors under the vision of the Ministry, which cover printing and publishing, private radio and television facilities and artworks. Freedom and plurality of information is guaranteed by law in Article 31 of the Basic Law of the State. A dedicated media licensing department issues licences to media institutions. Gender rights and equality are respected in the media. However, the rate of women media journalists and editors is 28 per cent, but more women are expected in the media field in the near future based on changes at the socioeconomic level.

The media in the State of Palestine are audible and readable, some of which are owned by the State and others by the private sector, all of which have been licensed. The media sector is subject to the press and publications law, the telecommunications laws and the law on audiovisual media. Government strategies and media, in practice, enhance and build upon a journalist's freedom to access information and freedom of expression. In their strategic intersectoral and sectorial media plans, Palestinian ministries and other bodies encourage investigative reporting, which is a major tool to discuss, steer and highlight issues of corruption and malfunction. Out of a total of 1,200 journalists registered with the Palestinian journalists' syndicate, 317 are women. The Ministry of Information issued a circular ordering local television and radio stations to appoint men and women journalists equally,

noting that 40 per cent of the employees at the Ministry are women.

In the Sudan, the media sector is governed by a number of laws and legislation, including the Press and Publications Law of 2009, the Telecommunications Law of 2018, the Law on Access to Information of 2015, the Law on Information Crimes of 2018 and the National Information Centre Law of 2010. The first women magazine in the Sudan was published in 1946 under the name of *Bent el-Wadi*, followed by a second one, *Sawt al-Mar'at* in 1955. The first women announcers go back to 1956. More than 2,500 women journalists were registered during 1993-2014, compared to a total of 7,000 journalists. Furthermore, Sudanese women journalists enjoy the same privileges as men in wages, rights to practice and entering universities.

Table 26. Media outlets, by category (*Part A*)

Country	Newspapers		Electronic newspapers		Magazines	
	Language	Ownership	Language	Ownership	Language	Ownership
Iraq	Arabic	Private: 7 Government: 1	...	...	...	...
Jordan	English, Arabic	Private: 28 Government: 3	English, Arabic	Private: 181	English, Arabic	Private: 836 Mixed: 5 Government: 16
Mauritania	French, Arabic	Private: 32 Government: 2	French, Arabic	Private: 235 Government: 1	French, Arabic	Private: 10 Government: 3
Oman	English, Arabic	Private: 13 Government: 2	Arabic	Private: 7	English, Arabic	Private: 31 Government: 28
State of Palestine	Arabic	Private: 110 Government: 2	Arabic	...	Arabic, English	Private: 220 Government: 5
Sudan	Arabic	Private: 5	Arabic	Private: 47	...	Private: 8 Government: 10
Syrian Arab Republic	Arabic	Private: 59 Government: 5	English, Arabic	Private: 84 Government: 9	...	Private: 95
Tunisia	French, Arabic	Private: 23 Government: 2	French, Arabic	Private: 235 Government: 1	French, Arabic	Private: 10 Government: 3

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: "..." indicates having no information.

The Syrian Arab Republic has a wide range of media owned by the State, the private sector, licensed political parties, and popular professional sectors, including television stations, websites, news agencies, radio stations, magazines, and newspapers. The State provides support to media and press organizations by granting financial advantages to journalists, including compensation for the nature of work, a financial system for the work of public media institutions and setting a low tariff for communications to media professionals. The Media Law (Legislative Decree No. 108) was promulgated in 2011,

which includes a set of provisions regarding rights and duties of media and media institutions, establishing the Higher Media Council (Decree No. 23 of 2016) as a reference authority to regulate the media sector, licensing aspects, and regulatory issues in the media sector. In 2018, the Ministry of Information, in collaboration with concerned authorities and in coordination with the union of journalists, was entrusted to amend the media law. A large number of women work in editorial services and the central administration of newspapers. Approximately 50 per cent of the total number of editors are women.

Table 27. Media outlets, by category (*Part B*)

Country	News agencies		Radio stations		Television stations	
	Language	Ownership	Language	Ownership	Language	Ownership
Iraq	...	...	English	Private: 0 Government: 1	English	Private: 2 Government: 0
	Arabic	Private: 50 Government: –	Arabic	Private: 98 Government: 44	Arabic	Private: 38 Government: 9
Jordan	English, Arabic	Government: 1	English, Arabic	Private: 39 Government: 15 Foreign: 3	English, Arabic	Private: 35 Government: 2
Mauritania	French, Arabic	Private: 7 Government: 1	French, Arabic, other national languages	Private: 3 Government: 13	French, Arabic, other national languages	Private: 5 Government: 3
Oman	English, Arabic	Government: 1	English, Arabic	Private: 8 Government: 5	English, Arabic	Private: 1 Government: 4
State of Palestine	Arabic, English	Private: 31 Government: 1 Foreign: 7	Arabic	Private: 58 Government: 1	English, Arabic	Private: 4 Government: 1

Country	News agencies		Radio stations		Television stations	
	Language	Ownership	Language	Ownership	Language	Ownership
Sudan	Arabic	1	Arabic indigenous languages	Private: 75	Arabic	Private: 17 Government: 19
Syrian Arab Republic	Arabic, English, French, Russian, Turkish, Farsi, Hebrew, Spanish	Government: 1	English, French, German, Russian, Spanish, Turkish, Hebrew	Government: 1	English	Private: 2 Government: 0
			Arabic	Private: 17 Government: 8	Arabic	Private: 3 Government: 6
Tunisia	French, Arabic	Private: 7 Government: 1	French, Arabic, other national languages	Private: 3 Government: 13	French, Arabic, other national languages	Private: 5 Government: 3

Source: Compiled by ESCWA from the National Digital Development Reviews 2019.

Note: “...” indicates having no information.

In Tunisia, the High Independent Authority of Audiovisual Communication is a constitutional authority mandated with the regulation of the media sector. A number of laws govern the media sector to guarantee access to information, independence and freedom of expression. Since 2011, media pluralism improved the freedom of information and freedom of speech. Indeed, the multiplication of media means facilitation of access and dissemination of information, provided that there are several information sources. Citizens are more involved in public decision-making through the media sector that discusses public affairs and public policies. Citizens are also able to assess politicians and decision makers through information disseminated by media and related to public affairs.

2. The media and its role in the information society

The pluralistic aspects of media in the Arab countries are essential for a balanced knowledge-based society and increasing the maturity of citizens. Traditional media (printed newspapers, radio and television) are still important and trusted by citizens in all Arab countries since they provide education and spread knowledge through radio and television programmes that, for instance, raise the awareness of farmers regarding agriculture and development. The newer media provide two-way communication and are more enriching, providing an alternative to the traditional

media. More details on the role of the media in the information society within each of the participating Arab countries are provided below.

All media in Iraq use advanced technologies such as audiovisual interactive systems. CMC established a website which contains all information, laws and activities of the commission, organized several conferences on freedom of media in Iraq and issues the monthly magazine *Tawassul* to build ICT awareness.⁷⁴ There are several educational television channels which offer lectures for the intermediary and preparatory school grades and continuous lectures for increasing IT awareness of parents. Furthermore, most channels meet with ICT specialists to discuss the benefits and harms of using new electronic devices, namely tablets and smartphones. A television channel called *Al-Jamiyyiah* was created to document the many activities of the Ministry of Higher Education, universities and colleges.

Media in Jordan play a central role in the development of a knowledge-based society. A landscape of free and pluralistic media, including public, private and community-based, is essential for transparent and accountable political and economic systems. It must be confident, vibrant, entertaining, surprising, proactive, balanced, and informed. Since social media provide two-way communications, personal accounts for ministers have been used lately to provide information and collect feedback on governmental decisions. Haggak.jo (*Haggak Tiraf* – حقائق تعرف) is a formal e-platform which aims to provide accurate information to media followers to prevent the transmission of rumours and create a culture of verification of information.

In Kuwait, the traditional media of radio, television and the press are still considered the main and reliable sources of information for bridging the knowledge gap, and they cannot be dispensed of. Radio Kuwait is a key element in bridging the knowledge gap, especially in remote areas. However, new social media are used in the dissemination of official public information and use of information, given their great impact on various aspects of life and considering the possibility of interactivity with the public.

Mauritania has a number of daily and weekly newspapers that are flourishing. In addition, new electronic media, or social media, have become a major source of information due to their ease of communicating. Even though it seems that the new media dominate over the traditional media, the use of traditional media remains essential to bridge the knowledge gap and facilitate the flow of knowledge, especially in rural areas. With the expansion of networks and the availability of the Internet in large areas of the country, digital means provide an alternative to the traditional media, although rural radio allows raising awareness in agriculture and development.

The media in Oman maintain an intent focus on both individual and institutional performance. Its programming is an embodiment of the public policies of the State in all fields. It espouses media values that celebrate development in all its aspects, social, cultural and economic, and promotes ethical norms and values and a more cohesive expression of national unity. Omani media develop messages consistent with the needs and priorities of the public, taking into account the types, quality, attractiveness, and promotion in their consideration of rural areas. Printed newspapers, magazines and weekly tabloids dominated by entertainment, sport and

advertising are distributed in all of the country. They are delivered free of charge either together with their affiliated newspapers or distributed individually. Public entities also use social media for reporting and interacting with people, and a policy for e-participation and social media exists.

In the State of Palestine, social media play an important role in creating a knowledge-based society. They help shape public opinion and strengthen society. They are also used by political parties and the State to spread remorse and conflicting news and by the intelligence apparatus for recruitment purposes. Social media are used by ministries to spread achievements and launch propaganda. Media act as a watchdog to protect the public interest against malpractice and create public awareness. The State of Palestine is ready to support media-based programmes in local communities and support projects combining the use of traditional media and new technologies for their role in preserving local heritage, supporting diversity and mirroring the Israeli occupation atrocities in rural and Bedouin areas. It also encourages traditional media as a means of reaching rural, isolated and nomadic communities and enable them to voice their needs and achievements.

In the Sudan, a continuous campaign is organized by the National Information Centre in the form of advertising in all media outlets, namely radio, television, websites, and social media, to promote the shift from cash to e-payment methods in banking transactions and business transactions such as points of sale and payment by mobile phone. The Information Forum Programme, held annually, aims at evaluating ICT projects that have an impact at the national level. It contains various scientific and capacity-building activities, such as workshops,

seminars and exhibitions. Radio and television remain the most important means of delivering knowledge in rural areas since the communication infrastructure contributed to the dissemination of high-quality radio channels in rural areas. More than 15 managed FM channels were deployed and the programmes are heard in the countryside by use of broadband technology.

In the Syrian Arab Republic, several factors contributed to deepening the role of the media in building societal thought, forming public opinion and influencing the formation of their interests and their intellectual and political orientations, including modern aspects of the media law of 2011, increasing Internet penetration in Syrian society and the private-sector contribution to the diversity of the media. All this has led to a deepening of the freedom of opinion, expression and exchange of information in support of, and consistent with, the principles of the information society. The traditional audiovisual media have maintained their historical role in facilitating the flow of information and knowledge throughout the Syrian territory, while printed media have begun to decline. Electronic media, especially social media, flourished in the circumstances of war since the factor of speed in access to information was most important and even critical. Most of the traditional media, such as the Syrian Arab News Agency, used mobile text-messaging services to spread the acquired information to the largest community segment in the rural and urban areas of the country.

Various types of media play an important role in keeping society well informed in Tunisia. Indeed, the diversification of media means or channels, including radio, newspapers and magazines, aims to reach the largest audience in society. By archiving and disseminating the cultural heritage, containing sound, films and documentaries, of a country, people could know more about the

history of their country and preserve it for future generations. Citizens will be more involved in public life and public affairs, especially through social media channels that are used by public entities to engage the public in e-government activities. The multiplicity of media and information sources can be an opportunity for citizens to filter the flow of information that they receive, choose reliable and credible information and consequently improve their maturity. This aspect will push media stakeholders to work more in order to win the trust of the people. Yet, and despite the evolution of media channels due to the ICT evolution, traditional media cannot be neglected. For instance, in Tunisia, the National Broadcasting Corporation (NBC) has a monopoly on terrestrial broadcasting distribution. As a result of the NBC's work, the analogue network of services of public television reached 99.8 per cent of homes. NBC operates one hundred transmission and retransmission sites distributed throughout the country. It is worth noting that Tunisia is the only State that has the right of access to information enshrined in its constitution.

3. Convergence between ICT and the media

The worldwide convergence of ICT with various forms of media, including Internet, television, radio, and newspapers, led the Arab countries to join this trend, albeit not at the same accelerated rate as in developed countries. The principles of technology neutrality, particularly Internet neutrality and spectrum assignment, need to be introduced in a fair and non-discriminatory manner. Internet protocol television (IPTV), media production and satellite services providers are turning to TeleVision Unit (TVU) networks technology. More details are provided below for participating Arab countries.

Iraq has a decent infrastructure capable of providing audiovisual transmission through the Internet. The State, represented by the Ministry of Communication, invested in this infrastructure as did the private sector through Internet service providers. Television and radio transmissions moved to the mobile phone environment. Media organizations benefited from the infrastructure to transmit over the Internet through their websites. Iraqi journals have websites through which they publish an electronic version of their issues, keeping their previous issues in an archive. The ICT strategy draft stressed the integration of media with modern communications technologies using state-of-the-art technology to deliver information to the people.

In Jordan, the convergence of IT, media and telecommunications, enabled by next-generation networks, requires operators to examine their competitive position and regulators to revise the way in which they control the market, especially with regard to net neutrality. Meanwhile, technology neutrality needs to be applied to new spectrum assignments for use in the provision of public telecommunications services by licensed operators, while investigating how technology neutrality for assigned spectrum holdings can be introduced in a fair and non-discriminatory manner. The introduction of such technology would minimize the possibility of obsolescence and, hence, inefficient use of particular bands as service usage changes.

In Mauritania, most traditional media organizations have taken advantage of their presence in the digital space, through social media networks and smartphone application, and the convergence of all traditional and digital means, namely television, Internet and telephone, which are in use today.

The Omani Ministry of Information launched a digital service platform (*Injaaz*) for individuals, governmental and private-sector institutions, in which more than 170 media-related services are available and integrated with the system of the Royal Oman Police and the Ministry of Commerce and Industry. Its portal includes ITA-approved e-certification and e-payment gateway. The digital media sector is the link that connects the Public Authority for Radio and Television (PART) with the online public via digital services that deliver news to the Internet and social media. At present, 40 such subscriber and public web portals and telephone applications are actively supplying news to the public, expanding the reach of broadcasters to new audiences. Young people are turning to hand-held devices for their consumption of news and PART's digital policy is responding to this trend.

Over the last decade, the ICT sector in the State of Palestine has shown continuous growth in products and services provided to businesses, government and households. The usage of Internet and social media has shown tremendous growth during the last few years reflecting actual and potential additional investment opportunities within the sector. In 2012, the State of Palestine adopted an ICT private-sector strategy and development plan, but the political situation has deterred convergence. As a result, all local television and radio stations turned into IPTVs, and media production and satellite services providers are turning to TVUs.

The number of satellite channels licensed and operating within the Sudan exceeds 17. In at least two of them the convergence is clear, namely live broadcast on the satellite and live broadcast on the Internet.

In the Syrian Arab Republic, the convergence between the media and telecommunications sectors is already in place and continuing, being imposed by national interests. Through the existing infrastructure, the country was able to launch services related to the convergence between ICT and media. The most important components that contributed to this are the following: the fixed communications network, which is mainly a fibre-optic network that is being built; the mobile telecommunications network, which requires the activation of long-term evolution (LTE) technology to provide wireless 4G services that mobile operators began to implement in 2017; and IPTV services launched in 2018 becoming available to users either through fixed Internet or mobile Internet. The IPTV service is being provided in coordination between the Ministry of Information concerned with the granting of licences and approvals related to the submitted content, on the one hand, and the Telecommunications and Post Regulatory Authority that licenses the application services, on the other.

Tunisia deployed important efforts in order to ensure the largest coverage for all citizens. In fact, two land stations allowed the transit via Intelsat and Arabsat, and the public television channels are available on Nilesat and some other satellite platforms. However, most Tunisian private television channels are broadcasted via satellite only. For its infrastructure, media in Tunisia have access to modern techniques for the collection, production and distribution of information, given that the telecommunications infrastructure is robust enough.

In the United Arab Emirates, the convergence of television, Internet and telephony (triple

play) is applied by the telecommunications providers Etisalat and Du in the form of integrated services.

4. Social media in the Arab world

All Arab countries agree that social media have changed the way people live, think and work in the region, sometimes for the better and sometimes for the worse. There is no doubt that social networks help people interact socially, exchange information quickly, discuss problems and solutions at the local level, and increase knowledge and creativity. Looking for a job or trying to discuss a political or social issue has become easier and quicker through social networking. Social media certainly affect the youth in a dramatic way but also mature people who may become addicted. Raising awareness of positive and negative aspects of social media is essential for a balanced and healthy use. The following provides more details about social media in the participating Arab countries.

In Iraq, social media have created new ways of communication for society, which had a significant impact on people's daily lives. The most important advantages of using social media in Iraq are adding creativity to thinking, discovering and engaging actively, building social relationships, improving self-efficacy and enhancing cognitive flexibility and self-control, facilitating finding jobs in their area of interest, promotion of products, and exchange of ideas between people from very different cultures. However, the impact of social media on people and their behaviour is enormous, particularly on young people because they do not realize the devastating impact their actions or words may have on others. Hence, the disadvantages of

using social media are numerous and include the misuse of the Internet by hackers, increased attitudes and violent behaviour in children, spreading rumours over the Internet, and health effects due to excessive use, which may sometimes lead to addiction.

Social media play a two-sided role in the Jordanian information society. On the one side, the social media play a negative role by causing the emergence of identity theft cases, the promotion of false rumours, racism, and extortion issues. On the other side, they have played a major positive role at the national level by preserving security in the country.

The Kuwaiti Department of Media Services and New Media highlights the role of social media in raising awareness and building the information society. This is done through employing IT in the dissemination of programmes, seminars, conferences, and courses related to building the information society. Additionally, social media applications keep people abreast of the rapid developments in ICT and contribute to the diffusion and accessibility of information to the community.

In Mauritania, social media began to spread with the expansion of smartphones in the country, thus facilitating the exchange of video clips and audio tracks. Social media play an important role in raising awareness and building opinions, particularly since their role exceeds that of the traditional media given their interactive nature.

In Oman, social media play a major role in raising awareness in communities, spreading innovative ideas and engaging the public in decision-making on various issues. According to a number of surveys and studies, the confidence of the citizen in the electronic media in general increases for women more than men. New

means of communication on the Web, social networking sites and smartphone applications have achieved high averages.

Social media have a strong impact on Palestinian society, and, at the same time, constitute a double-edged sword which is used by governmental services to highlight achievements, launch media campaigns and deliver official statements.

More than 13 million Sudanese citizens use the Internet through mobile phones, and more than 80 per cent of those use social media. WhatsApp and Facebook are most used, with Facebook users reaching 5.6 million Sudanese citizens inside and outside the Sudan. They are an important tool for the circulation of news, music, scientific videos, and political propaganda. All official and non-official governmental institutions use social media to conduct their work through reports, invitations to meetings and the provision of social guidance.

Social media introduced the new concept of citizen journalism in the Syrian Arab Republic. Every citizen can become a journalist capable of generating information and disseminating it to the public. This phenomenon created new challenges related to the ability of auditing and documenting the information being produced, published and then exchanged. It played a multifaceted role during the war, documenting the events of the war, on the one hand, and reflecting on these events and news, on the other. In many cases, the absence of awareness and lack of assessment of the validity of the information in the circumstances of the war often deepened the conflicts. WhatsApp and Facebook are the most popular social media applications in the country.

In Tunisia, social media and social networks have emerged as popular communication channels given their simplicity and low cost. Even youth and marginalized groups can easily access information on national, economic or social issues and disseminate them. Therefore, the social media strengthen the sociability level among users, who become more informed and able to discuss issues interactively. More than 84 per cent of the Tunisians used the Internet in 2018, mostly social media tools, making people more informed and more involved in public life.

The society of the United Arab Emirates has one of the highest penetration rates of social media in the region. It has, by far, the highest usage rate of Facebook accounts, with almost 95 per cent in 2017. It also has the highest penetration rate in terms of LinkedIn usage in the region and is among the regional top five in usage of Instagram and Twitter.⁷⁵ Due to its high penetration, social media have been used heavily by almost all governmental agencies to interact with the public, deliver services and drive engagement. At the political level, social media have also been used heavily in election campaigns by candidates and the public in the federal national council elections, and by businesses for commercial (retail, marketing and sales) and financial services.

C. Towards enhancing culture and media – related policies

The information and analyses in cluster 5 show that great efforts were made in the Arab region as far as culture and media are concerned, but more needs to be done to preserve the local and regional culture and increase information spreading in the following areas:

- Digitization of public libraries and their archives, historic manuscripts, museum artefacts, and historic buildings;
 - Providing multimedia websites for museums and libraries;
 - Expanding the variety of digital media to enrich information about the social, political and economic landscapes of Arab countries;
- Providing detailed information on media institutions, including structure, expertise and management with gender-related data;
 - Formulating and implementing official convergence strategies between ICT and media;
 - Carrying out awareness-raising of social media, their usefulness, effectiveness and harmfulness through unrestrained behaviour.

3. The Arab Information Society through a Developmental Lens

This chapter provides an analysis of the Arab information society as depicted in chapters 1 and 2, through a specific developmental lens derived from the HLPF Theme of 2019, focusing on the nexus between information society and inclusiveness as well as empowerment, and eventually leaving no one behind.

A. Digital technologies and sustainable development in the world

A research commissioned by Huawei and carried out in collaboration with SustainAbility explored the relationship between ICT and sustainable development, trying to understand how ICT can support the SDGs and contribute to their achievement.⁷⁶ Six goals were selected among those that ICT can affect and 15 countries representing developed and developing economies, different geographies and different phases of ICT development.^{77,78}

Four indicators were used to evaluate each SDG and 11 ICT indicators were included from the ITU's most recent ICT Development Index. Country performance on SDGs and ICT development was explored, providing insights into the successful application of ICT for sustainable development. The data were combined into a single index, known as the 2017 ICT Sustainable Development Goals Benchmark, and the following was deduced:

- A high correlation, namely 89 per cent, exists between country-level SDG performance and ICT use, suggesting that countries performing well on ICT also perform well on SDGs, and those that underachieve on ICT also underperform on SDG attainment;
- Some SDGs have higher correlation with ICT than others, particularly SDGs 3, 4 and 9, suggesting that ICT leverages some areas more than others with respect to sustainable development;
- Developed countries have higher ICT scores, based on the 11 ICT indicators, than SDG scores, based on the four SDG indicators, while developing countries have higher SDG scores than ICT scores. This indicates that developed countries are advancing faster in ICT than they are in the achievement of SDGs, while the pace of ICT advancement is lower in developing countries than that of SDGs. This could be explained by the fact that developed countries are continuing to advance in ICT, but just started working on achieving the selected SDGs in 2016. Developing countries are focusing on progress in achieving SDGs without necessarily taking ICT into consideration. This finding suggests that ICT policies should be more vigorous in developed countries to catch up with developing countries and achieve their SDGs faster;

- SDG benchmarking is associated with the Human Development Index and the Environmental Performance Index more than the GDP per capita. Therefore, the optimal use of available resources, both human and material/financial, is more important than the volume of available resources.

This study reveals a significant and positive link between the expansion of ICT usage and progress in sustainable development, particularly due to improved connectivity and efficiency. ICT can accelerate development through education, skill development and innovation in services, among others.

A newer ICT SDG Benchmark report was produced by Huawei in 2019,⁷⁹ increasing the number of countries analysed to 55 and classifying them into three performance categories, namely leaders (top performers), contenders (mid-level performers) and improvers (low-level performers). Again, these countries were selected to represent developed and developing economies and different phases of ICT and sustainable development maturity. The same six SDGs and 11 ICT development indicators as in 2017 were used in benchmarking.

The number of represented Arab countries increased from two in 2017 to six in 2019,⁸⁰ all of which are in the second half of the countries listed by decreasing performance, with scores between 68.8 and 52.6 out of 100, noting that the highest score is 84.4 (South Korea) and the lowest 31.4 (Nigeria). None of the six Arab countries was considered leader, the first three were classified as contenders and the following three were classified as improvers.

The 2019 study confirmed again the strong relationship between ICT maturity and achieving

SDGs, through a high correlation, namely 86 per cent, between ICT development and progress on the SDGs. The 53-point gap between the top and bottom performers points to the existing difficulties in closing the divide between developed and developing countries in both ICT development and in SDG achievement. The study also showed that SDGs 3, 4, 7 and 9 have the highest correlation with ICT, suggesting that small investments in ICT may lead to major SDG gains, which is important for improver and contender countries, including the Arab countries.

The study concludes that partnerships and multi-stakeholder initiatives should facilitate harnessing ICT to achieve the SDGs, since it provides the means to accelerate progress on the urgent and complex challenges facing the world in general and developing countries in particular.

B. Inclusiveness in building the information society in the Arab region

1. Inclusive Internet Index

In chapter 2, cluster 4, of this study, a qualitative explanation of inclusiveness was provided in a social inclusion context. A quantitative approach for inclusiveness related to access to the Internet is adopted in this chapter, whereby an index is defined based on sub-indices measured using standard global indicators. The Economist Intelligence Unit (EIU), commissioned by Facebook, published the Inclusive Internet Index for a third consecutive year in 2019,⁸¹ covering 100 countries, representing 94 per cent of the world's population and 96 per cent of global GDP. The index benchmarks Internet inclusion across four categories, namely availability, affordability, relevance, and readiness.

An Internet survey polled 5,069 respondents from Asia-Pacific, the Americas, Europe, the Middle East, North Africa, and Sub-Saharan Africa, revealing what people use the Internet for, how often, the benefits they receive, and the obstacles they face. Eleven Arab countries were included, for which the Inclusive Internet Index, based on sub-indices, was computed. In this context, it is worth noting that the authors selected the EIU Internet Inclusiveness Index because it focuses on inclusiveness in the cyberspace through combining measures for availability, affordability, relevance, and readiness, while other indices, such as the ITU ICT Development Index, focus on ICT development in general and are based on measures for access, use and skills. While both indices are important, the ADDR 2019 is focusing on inclusiveness rather than ICT development in general.

The latest EIU exercise shows that, at the international level, the gap between those with access to the Internet and those without access

has narrowed, following progress in access, affordability and quality of coverage. Inclusion for women and persons with disabilities has improved, with low-income and lower-middle-income countries progressing. However, there are also widening digital divides. Low-income countries are seeing a lack of progress in Internet access with a marked slowdown while progress is achieved in other parts of the world. Affordability is also declining relative to the monthly income in many countries, thus disproportionately affecting people in low-income countries and women, both of whom are more reliant on mobile devices as their primary means of accessing the Internet.

The 11 Arab countries involved in the latest survey leading to the computation of the 2019 Inclusive Internet Index are listed in table 28. Qatar ranks first at the regional level, but ranks 37th out of 100 at the international level, with a score of 75.5 out of 100. The Sudan ranks last at the regional level and 90th at the international level.

Table 28. Inclusive Internet Index, 2019

Arab ranking (Out of 11)	International ranking (Out of 100)	Country	Score (Out of 100)
1	37	Qatar	75.5
2	38	Kuwait	75.4
3	39	Saudi Arabia	75.3
4	43	United Arab Emirates	74.2
5	49	Oman	72.2
6	52	Jordan	70.8
7	60	Tunisia	68.0
8	62	Morocco	67.4
9	69	Egypt	63.5
10	73	Algeria	59.6
11	90	Sudan	44.8

Source: The Economist Intelligence Unit, 2019a.

Table 29. Availability of access to the Internet, including usage, quality, infrastructure, and electricity

Arab rank (Out of 11)	International rank (Out of 100)	Country	Score (Out of 100)
1	25	Qatar	75.9
2	27	United Arab Emirates	75.8
3	31	Kuwait	73.6
4	37	Saudi Arabia	71.6
5	41	Oman	70.3
6	42	Jordan	70.2
7	47	Morocco	67.8
8	52	Tunisia	64.8
9	55	Egypt	64.2
10	67	Algeria	57.0
11	89	Sudan	32.4

Source: The Economist Intelligence Unit, 2019a.

This overall index score is based on the scores of the categories of availability, affordability, relevance, and readiness that are given in tables 29, 30, 31, and 32.

(a) Availability

Availability refers to the quality and breadth of available infrastructure required for access to the Internet and levels of usage. Table 29 provides the regional and international ranking of each of the 11 participating Arab countries as far as availability is concerned. Qatar ranks first for this sub-index and the Sudan last, at the regional level, with little change in the ranking of the other countries as per the Internet Inclusiveness Index. The international ranks for availability show that the scores and rankings of participating Arab countries are

slightly better for availability than for the full index.

(b) Affordability

Affordability refers to the cost of access relative to income and to the level of competition in the Internet marketplace. Table 30 provides the regional and international ranking of each of the 11 Arab countries as far as affordability, the components of which are price and competitiveness, is concerned. Kuwait is first at the regional level, meaning that the cost of access is the lowest and competitiveness is highest in the region, relative to the average income. Tunisia is second and the Sudan last. Oman is ranked before last and Algeria, Morocco and the United Arab Emirates have the same score, ranking 66 at the international level.

Table 30. Affordability of access to the Internet, including price and competitive environment

Arab rank (Out of 11)	International rank (Out of 100)	Country	Score (Out of 100)
1	16	Kuwait	89.2
2	45	Tunisia	77.0
3	49	Saudi Arabia	74.9
4	60	Jordan	71.4
5	62	Qatar	70.9
=6	=66	Algeria	69.5
=6	=66	Morocco	69.5
=6	=66	United Arab Emirates	69.5
9	69	Egypt	69.2
10	74	Oman	67.1
11	89	Sudan	56.4

Source: The Economist Intelligence Unit, 2019a.

Table 31. Relevance, including local and relevant content

Arab rank (Out of 11)	International rank (Out of 100)	Country	Score (Out of 100)
1	37	Saudi Arabia	84.0
2	40	Oman	81.6
3	45	United Arab Emirates	79.5
4	49	Qatar	76.2
5	56	Jordan	72.8
6	70	Tunisia	66.9
7	72	Morocco	65.9
8	74	Kuwait	65.3
9	82	Egypt	58.3
10	89	Sudan	53.7
11	92	Algeria	51.8

Source: The Economist Intelligence Unit, 2019a.

Table 32. Readiness, including literacy, trust and safety, and policy

Arab rank (Out of 11)	International rank (Out of 100)	Country	Score (Out of 100)
1	1	Qatar	86.5
2	28	Oman	76.4
3	39	Saudi Arabia	74.2
4	48	United Arab Emirates	70.9
5	58	Jordan	67.7
6	65	Morocco	62.4
7	68	Kuwait	61.8
8	79	Tunisia	56.3
9	80	Algeria	56.1
10	84	Egypt	53.8
11	97	Sudan	41.5

Source: The Economist Intelligence Unit, 2019a.

(c) Relevance

Relevance refers to the existence and extent of local language content and relevant topics in the content. Table 31 provides the regional and international ranking of each of the eleven Arab countries as far as relevance is concerned. Saudi Arabia is ranked first and Algeria last at the regional level. At the international level, Saudi Arabia is ranked 37th and Algeria 92nd.

(d) Readiness

Readiness refers to the capacity to access the Internet, including literacy and skills, cultural acceptance and trust and supporting policy. Table 32 provides the regional and international ranking for each of the eleven Arab countries as far as readiness is concerned. Again, Qatar is first, not only at the regional level, but also at the international level with a score of 86.5 out of 100. At the regional level, Oman is second, Saudi Arabia third, Egypt 10th, and the Sudan 11th.

2. Analysis of results

The analysis of the 2019 Inclusive Internet Index results, as per EIU study indicated above, shows the following trends at the global level:⁸²

- Internet access continues to increase, with more than half of the world's households connected; yet, some digital divides exist, notably in gender and web accessibility;
- Low-income countries are falling behind regarding Internet connectivity, which could be interpreted either as a temporary departure from narrowing the digital divide or as a new troubling trend;
- Affordability of 3G and 4G mobile has declined in nearly half the countries studied;
- The Internet has become a crucial tool for employment and improving livelihoods, but entrepreneurs, the under-employed and people in low-income countries are especially vulnerable to poor connectivity;

- Women are relying more heavily than men on mobile devices to get online, with 61.7 per cent of women most often connecting to the Internet this way, versus 52.5 per cent of men. Therefore, persistent increases in the cost of mobile data and devices, relative to monthly income, could disproportionately affect women in gaining Internet access.

At the Arab regional level, the analysis revealed the following findings:

- None of the 11 studied Arab countries ranked in the first third; GCC countries were ranked in the first half, and all non-GCC Arab countries in the second half;
- None of the Arab countries made it into the top 10 worldwide in the Inclusive Internet Index 2019, neither the top 10 countries in the upper-middle income bracket nor the top 10 in the lower-income bracket;
- Tunisia and Morocco made it into the top 10 countries in the lower-middle income bracket;
- Although gender gaps in Internet access are narrowing globally, led by low-income and lower-middle-income countries, most Arab countries have a gender gap varying between 3 per cent (for Qatar) and 53 per cent (for the Sudan);
- The third-largest year-on-year improvement in the number of household Internet connections was achieved by Kuwait with an increase of 28.3 per cent.

C. Empowerment through digital development

1. Digital development and digital economy

Digital development creates a huge data market, to which people around the world

contribute without being aware of it. Given the low cost of computing, digitized data become easier to collect, manipulate, store, and analyse, while additional data and information are produced. The digital economy includes data economy, which is estimated to be worth more than \$3 trillion globally.⁸³ Digital marketing is based on personal data, particularly for online advertising through social media. Hence, new opportunities are arising in the digital world based on access to information, albeit creating new challenges related to privacy. Digital open data can lead to building up information that permits improvements in all kinds of services, including health services, making them more effective by analysing personal data in real time and providing immediate treatment or predicting illnesses based on genetic analyses.

Empowering people with the technologies and digital literacy facilitates their understanding of the importance of their data and how to manage these data and benefit from them, which, when combined with digital technologies, can transform the global economy to a digital economy. The advancement of countries at the global level can be measured using available indices such as the Digital Adoption Index (World Bank)⁸⁴ and the Digital Evolution Index (Fletcher School at Tufts University).⁸⁵

At the regional level, ESCWA carried out a study entitled *Perspectives on the Digital Economy in the Arab Region*⁸⁶ to measure the transition of the Arab countries towards the digital economy in a methodical way. Six aspects were taken into account, namely the ICT sector: innovation and finances; ICT infrastructure and affordability; human capacity and research; ICT use by individuals, businesses and governments; economic impact; and social impact. For that purpose, the ESCWA study mainly focused on

two indices, the Networked Readiness Index and the Global Innovation Index.

Similar results are obtained by different measurements and studies, such as ICANN's report entitled *Accelerating the Digital Economy in the Middle East, North Africa and Turkey*,⁸⁷ and the UNCTAD *Digital Economy Report 2019*.⁸⁸ It can be construed that Arab countries fall into four different categories as far as their progress towards the digital economy is concerned.⁸⁹ The GCC countries are the most developed group, with high GDP, high ICT use, low illiteracy rates, and low unemployment rates. Jordan and Lebanon form the second group, with middle-income rates, advanced ICT usage and Internet penetration, low illiteracy rates, and medium unemployment rates. The third category includes Algeria, Egypt, Morocco, and Tunisia, with middle-low income rates, lower ICT usage rates and higher illiteracy and with a total of 100 million people unconnected. The fourth category includes countries affected by conflict, namely Iraq, Libya, the State of Palestine, the Sudan, the Syrian Arab Republic, and Yemen, and LDCs, namely Comoros, Djibouti, Mauritania, and Somalia. Regardless of these categories, the Arab region remains a consumer of digital technologies with low digital product and service development.

As concluded in the last analysis on measuring the digital transformation in the Arab region, the region is a net importer and consumer of digital technology, rather than a developer of digital assets and services. However, the Arab region has the opportunity to reap the digital dividends with concerted action by companies, governments and individuals, especially with the gap between demand from a digital-savvy young population and supply.⁹⁰

2. Empowerment and data-driven development

The World Bank defines empowerment as “the process of enhancing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes”.⁹¹ This is not the only definition of empowerment, but other definitions, too, include the notion of capabilities to make decisions and control resources to increase quality of life.

There are many symptoms of disempowerment, such as poverty, food insecurity, poor health, missed educational opportunities, and violence against women. Empowerment can lead to better development outcomes and features in two SDGs, namely Goal 5, “Achieve gender equality and empower all women and girls” and SDG 10, “Reduce inequalities in and among countries”. Empowerment can also lead to improvements in health, income, security, education and other outcomes that improve quality of life and are covered by the SDGs.

As indicated in chapter 2, cluster 4, empowerment in the context of social inclusion relates to the use of ICT in education, entertainment, political engagement, and economic benefits. ICT is a powerful tool for empowerment by creating economic, social and political opportunities for poor people in the developing world. For instance, online access to information about produce prices and exchange rates by farmers can transform the relationship between poor producers and middlemen. Connectivity through telephones, radio, television, and the Internet can make the voices of even the most marginal and excluded citizens heard, promoting greater government responsiveness. ICT can thus help overcome poor people's powerlessness and voicelessness despite inequalities in the

distribution of traditional empowerment assets such as education, land and finance. Furthermore, ICT can empower the poor by providing basic e-services, improving governance and facilitating entrepreneurship and access to financial services.

In 2018, the World Bank completed a report on ICT for development taking an in-depth look at how ICTs are affecting economic growth in developing countries, with a focus on data-driven development.⁹² Since data is considered the fuel of the 21st century and plenty is generated in developing countries, data, if managed properly, can empower them and increase their income. The main objective of the report is to assist developing country firms and governments to unlock the value of the data they hold for better service delivery and decision-making.

The expansion of the Internet and various applications will lead to the generation of huge amounts of data that need harnessing. Hence, data collection and management require policies to be set up by governments and companies in order to build feasible data-driven business models and make sure that

ethical considerations are taken into account, including privacy and other norms for the acquisition of data. On the technical side, big data analysis and the use of artificial intelligence become a must for all developing countries to harness data and exploit their benefits.

Measuring one aspect of empowerment, namely that of data for development, requires a number of indicators, particularly indicators on the availability of data, usage and affordability, in addition to a measure for digitization, for instance, the Digital Adoption Index.⁹³ Table 33 provides indicators on availability and affordability for Arab countries, showing that availability of 3G is relatively high (70 per cent and above) for the great majority of Arab countries, while Internet availability is lower than 45 per cent for the majority of these countries. Affordability of downloaded data is extremely low and constitutes a huge obstacle for the Comoros, Djibouti, Mauritania, Somalia, and Yemen. Affordability of downloaded data is low in other countries in state of conflict, where GDP per capita is low, including Iraq, Libya and the Syrian Arab Republic, hence inhibiting empowerment.

Table 33. Availability, affordability and usage of data

Country	Availability and users		Affordability and usage			
	Proportion of population covered by a 3G mobile network, 2015	Individuals using the Internet (Percentage of population), 2016	Price of 1 GB of data (US dollars per month, 2016)	Price of 1 GB of data (Percentage of GDP per capita per month), 2016	GB per data user, 2016	GB per mobile subscription, 2016
Algeria	46	43.0	9.72	3.0	0.447	...
Bahrain	98	98.0	15.79	0.8	...	...
Comoros	...	7.9	8.68	13.4	...	...
Djibouti	0	13.1	45.01	...	...	...

Country	Availability and users		Affordability and usage			
	Proportion of population covered by a 3G mobile network, 2015	Individuals using the Internet (Percentage of population), 2016	Price of 1 GB of data (US dollars per month, 2016)	Price of 1 GB of data (Percentage of GDP per capita per month), 2016	GB per data user, 2016	GB per mobile subscription, 2016
Egypt	98	41.3	1.36	0.5	...	0.31
Iraq	55	21.2	12.67	3.3	...	...
Jordan	99	62.3	7.08	2.1	...	...
Kuwait	97	78.4	16.67	0.7	...	...
Lebanon	97	76.1	19.00	2.9	...	...
Libya	50	20.3	10.80	...	...	...
Mauritania	30	18.0	11.71	13.0	...	...
Morocco	80	58.3	4.99	2.1	...	...
Oman	95	69.9	13.16	1.1	...	...
Qatar	98	94.3	16.48	0.3	...	...
Saudi Arabia	97	73.8	29.33	1.8	...	...
Somalia	30	1.9	...	...	...	...
Sudan	46	28.0	4.64	2.3	...	...
Syrian Arab Republic	70	31.9	8.12	...	0.165	0.06
Tunisia	94	49.6	4.35	1.4	...	...
United Arab Emirates	100	90.6	27.25	0.9	...	...
Yemen	80	24.6	11.61	14.1	0.103	0.02
Middle East and North Africa	77	58.0	14.64	2.2	0.5	0.2
Low income	43	11.2	14.59	20.7	0.24	0.13
Lower middle income	65	33.6	9.46	5.4	0.44	0.38
Upper middle income	82	53.0	11.50	2.2	1.77	0.65
High income	96	82.5	23.63	1.1	2.91	1.28
World	77	51.7	14.98	5.5	1.82	0.51

Source: World Bank, 2018.

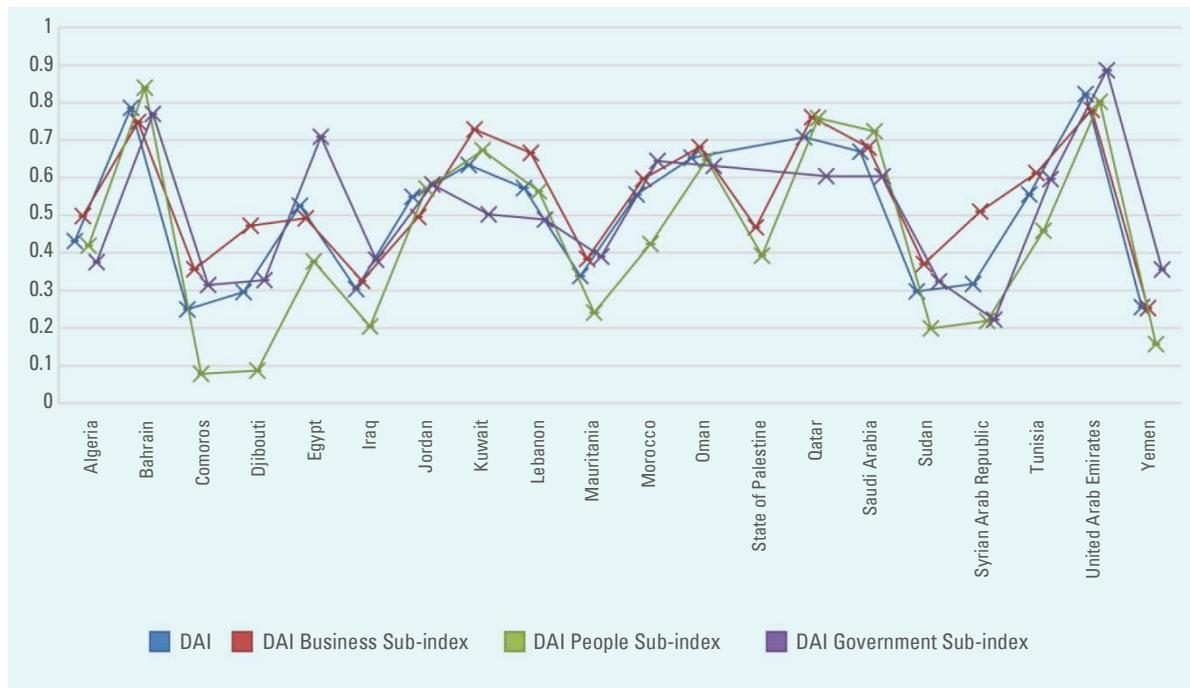
Note: "..." indicates having no information.

The Digital Adoption Index (DAI), measuring the expansion of digital technologies in a country, and its three sub-indices for business, people and government in each of the Arab countries are listed in figure 3. The United Arab Emirates has the highest DAI in the region, at 0.823, and Comoros the lowest, at 0.25. The DAI for GCC countries is above 0.65 and for countries in a state of conflict below 0.34. Hence, the GCC countries are well empowered for using ICT for

development, while most of the other Arab countries are poorly prepared given the low adoption of ICT.

It is worth noting that the above analysis of availability, affordability, usage of digital data, and DAI is in line with the four categories of Arab countries discussed above under the heading of digital development and digital economy.

Figure 3. Digital Adoption Index in Arab countries, 2016



Source: World Bank, 2016.

4. Recommendations



4. Recommendations

Digital technologies have a central role in sustainable development and constitute key enablers for social inclusion and empowerment. It has been shown that these technologies will shape the future and affect the lives of men and women in the current and future generations. These technologies are developing at a fast pace in developed countries, where their extensive and prevalent use leads to an acceleration in sustainable development.

In the Arab region, many countries are using digital technologies. The report emphasized the importance of their meaningful use as a means for empowering people and inclusiveness. Much remains to be done by Arab States and other stakeholders when it comes to research and development to cover the needs and priorities of their populations, leading to increased productivity and economic returns. Additional serious efforts are required at this stage to catch up with the rapidly changing nature of technology and the developmental challenges and to ensure the attainment of the 2030 Agenda's goals and targets.

This chapter provides concluding recommendations that are classified according to the main groups of stakeholders involved in national digital development towards further developing the information society, digital economy and digital transformation and harnessing their benefits in all sectors.

A. Recommendations to Governments

1. Strategic frameworks

- Develop regional and subregional digital strategies that are focused on the achievement of SDGs and provide a common understanding of the requirements needed to realize the international commitments as expressed in the 2030 Agenda for Sustainable Development, for the benefit of their countries and the Arab region as a whole;
- Formulate a long-term vision for development at the national level, taking into account the most important digital transformation trends expected to prevail in the foreseeable future, which affect the socioeconomic situation at the national, regional and global levels;
- Develop a master strategic sustainable development framework linking digital strategies to other strategies and plans of action, ensuring their complementarity and synergy amongst all activities aimed at achieving key SDGs;
- Perform internationally agreed measurements of the digital divides and other aspects of the information society on a regular basis to benchmark the country with respect to the region and the world, pointing to gaps and ways of recovering to help policymakers and

decision makers devise the required strategies;

- Develop a national digital strategy and sectoral strategies/plans of action that are well articulated with the vision, in coordination with stakeholders from the private sector and NGOs, particularly professional NGOs, to be revised periodically, noting that indicators of achievement should be included in the strategies and plans of action;
- Produce data disaggregated by gender and age groups for all measurements of indicators, to differentiate the actions to be taken according to these data;
- Make sure that national strategies are inclusive, articulating the needs of the persons with disabilities and people in remote and disadvantaged areas, with focus on the empowerment of women and meeting the needs of youth.

2. Infrastructure, governance and legal environment

- Provide a competitive environment for basic telecommunications, including fixed telephony and fixed broadband, by local-loop unbundling in order to reduce prices and improve services;
- Increase the international bandwidth for the Internet to allow all people to access the Internet and get necessary data and information, which is becoming the fuel of the century, while providing total coverage for 3G, 4G and WiMax in the country;
- Ensure ubiquitous access by all institutions, including governmental, educational, cultural, social, and health institutions;

- Provide ccTLDs in Arabic and encourage all organizations, public and private, national and international, to adopt fully arabized URLs to facilitate the utilization of the Internet by all people;
- Activate participation and involvement of public institutions in IG forums at the international and regional levels, while establishing formal national IG events and activities;
- Adopt national cyberlegislations for the protection of privacy and digital data and coordinate them regionally;
- Formulate a strategy and a legal framework to combat cybercrime at the national level, which should incorporate capacity-building of legislative systems and personnel;
- Adopt and legally enforce measures to protect children from abuse on the Internet;
- Adopt and legally enforce policies and technical measures for the safety and legality of e-transactions, e-documents and e-authentication.

3. Digital economy, employment and trade

- Enforce the formalization of the ICT economic sector, with the provision of information on ICT firms, including small IT companies, and their classification according to size, revenues and workforce, requiring them to deliver the latter structured by level of seniority and disaggregated by gender and age;
- Establish observatories for digital technologies to collect data on ICT goods and related industries as well as online trade, carrying out analyses

leading to improved knowledge of the ICT sector and its contribution to national economies;

- Develop an RDI strategy for digital technologies involving governmental, academic and industrial institutions focusing on local needs and the development of advanced digital goods for export;
- Collaborate with regional and international establishments and institutions in the field of RDI for digital technologies through global partnerships;
- Facilitate investment in digital technologies through the development of special economic and industrial zones through tax reduction and procedure simplification;
- Accelerate the adoption of e-payment and e-commerce processes and facilitate their implementation and expansion at the national and regional levels;
- Collect and publish statistics on employment in the ICT sector and e-employment, with sex- and age-disaggregated data in support of initiatives for the empowerment of women and youth;
- Formally recognize teleworking as a legitimate form of employment with all rights and privileges.

4. Digital transformation and social inclusion

- Expand the geography of access and knowledge centres to cover all remote and disadvantaged areas and to provide a variety of e-services and specialized training to cover the needs of the society;

- Provide broadband connectivity to homes at reduced prices in order to increase affordability for low-income families and encourage the use of the Internet for access to knowledge and important applications such as e-government, e-learning and e-health;
- Develop modern learning curricula in schools with the use of e-books, including ICT as a major subject and as a tool for e-learning;
- Establish virtual schools and universities to facilitate studies for youth in remote areas, and provide high-quality education for all;
- Develop and expand e-government services to become interactive with e-payment and e-procurement and the possible use of social media tools and applications on smartphones and tablets to accomplish these services, noting that e-government remains the national backbone and central engine for building the digital society;
- Develop and implement a national e-health strategy, including advanced and harmonized networked hospital and pharmaceutical management systems following compatibility standards, in addition to telemedicine and digital follow-up systems.

5. Culture and media

- Digitize public libraries, their archives, historic manuscripts, museum artefacts and historic buildings to facilitate access to knowledge and to get prepared for coming digital transformations;
- Build multimedia websites for museums, libraries and historic buildings to establish virtual spaces

of culture that can be accessed easily and remotely;

- Increase the number and variety of digital media to enrich the social, political and economic landscapes of the Arab countries;
- Provide detailed information on national media establishments, their structure, available expertise and management competencies with gender-disaggregated data;
- Formulate national convergence strategies between ICT and media and collaborate with other Arab countries to provide regional convergence strategies;
- Harness social media to accelerate development through a participatory approach, by cultivating awareness about social media, their usefulness and effectiveness as well as the nuisance of unrestrained behaviour.

B. Recommendations to the private sector

1. Strategic frameworks

- Collaborate with Governments through partnerships in order to formulate national digital strategies and plans of action and implement them, making sure that they are pertinent and satisfy the needs of people and the market with attention to the engagement of women and youth in economic and political activities;
- Provide data for internationally agreed ICT indicators regarding firms and digital goods, including data disaggregated by gender and age groups.

2. Infrastructure, governance and legal environment

- Provide enhanced communications and digital services according to international standards through partnerships with Governments, while building capacities in the industrialization of digital products adapted to the needs of the country and region;
- Actively participate in Internet governance forums at the international, regional and national levels to convey the needs of the country and region in this regard;
- Apply recognized norms for the protection of privacy and digital data;
- Apply measures to protect the children from abuse on the Internet;
- Apply technical procedures for safety and legality of e-transactions, e-documents and e-authentication.

3. Digital economy, employment and trade

- Provide data on ICT manufacturing, produced goods and online trade to official statistical organizations and observatories;
- Provide information on ICT firms, their size, revenues and workforce structured by level of seniority and disaggregated by gender and age;
- Partner with academia to carry out RDI for digital technologies focusing on local needs and the development of advanced digital goods for export;
- Collaborate with regional and international companies to develop novel digital technologies through global partnerships;

- Adopt e-commerce processes and implement them locally and internationally;
- Provide information on employment in ICT companies, with disaggregated data for women and youth, and on the use of e-employment;
- Use of teleworking as an effective form of employment that has a positive impact on the employment of women, persons with disabilities and individuals living in remote areas.

4. Digital transformation and social inclusion

- Collaborate with the Government and NGOs to build access and knowledge centres in disadvantaged and remote areas;
- Provide low-cost solutions for fixed-broadband (ADSL) and 3G/4G mobile connections to increase affordability of broadband connectivity and the use of the Internet for access to knowledge and important applications;
- Partner with academic institutions and the ministry of education to establish virtual schools and universities;
- Collaborate with Governments to render e-government interactive, providing e-payment and e-procurement services through all means, including smartphones and tablets;
- Provide solutions for telemedicine, digital follow-up health systems and advanced hospital and pharmaceutical management systems and collaborate with the ministry of health to implement them.

5. Culture and media

- Collaborate with various cultural establishments to develop systems for digitizing their contents in order to facilitate access to accumulated knowledge and to prepare for increasing digital transformations;
- Design and implement virtual spaces of culture in partnership with cultural institutions to allow for easy and remote access.

C. Recommendations to academia and NGOs

1. Strategic frameworks

- Collaborate with Governments and the private sector through partnerships to incorporate the views of academia and the professional community into digital strategies and plans of action;
- Provide data for internationally agreed ICT indicators for various NGO stakeholders, particularly those related to education, training, and research and development, including data on staff disaggregated by gender and age group;
- Focus on articulating the needs of persons with disabilities and people in rural and disadvantaged and marginalized areas, and on empowerment of the whole society through awareness raising, training and education, particularly for women and youth.

2. Infrastructure, governance and legal environment

- Provide universal and free Internet access to all academic staff, professionals and students at educational, cultural, and social institutions;
- Adopt fully Arabized URLs for all academic and professional organizations to facilitate the utilization of the Internet by all people;
- Actively participate in IG forums at the international, regional and national levels;
- Carry out research and develop ways to protect privacy in the cyberspace through devising and implementing capacity-building plans for all stakeholders.

3. Digital economy, employment and trade

- Carry out RDI in digital technologies in partnership with private firms focusing on local needs and the development of advanced digital goods for export;
- Collaborate with regional and international companies and academic institutions on RDI in digital technologies through partnerships;
- Provide statistics on ICT professionals employed at academic institutions and on the use of e-employment processes, with disaggregated data for women and youth;
- Use of teleworking as an effective form of employment that has a positive impact on the employment of women, the disabled and individuals living in remote areas.

4. Digital transformation and social inclusion

- Provide lifelong learning and training centres in schools, colleges and universities using digital technology tools to provide necessary updates on knowledge, particularly for new professions;
- Collaborate with Governments to establish virtual schools and universities with all professional staff and tools needed to ensure the success of these ventures;
- Partner with the ministry of education to develop modern learning curricula in schools using e-books, with ICT as a major subject and as a tool for e-learning;
- Develop digitized academic content in schools and universities in collaboration with the Government and the private sector to facilitate and accelerate e-learning at all levels, providing quality and higher education.

5. Culture and media

- Provide expertise in digitizing contents to the Government and other stakeholders in order to facilitate access to accumulated knowledge and in preparation for emergent digital transformations;
- Provide expertise to cultural institutions on building virtual spaces of culture that can be accessed easily and remotely;
- Collaborate with governmental institutions in charge of media to enhance digital media for enriching the social, political and economic landscapes at the national level;

- Contribute to the collection of detailed information on national media establishments, their structure, expertise and management competencies with gender-disaggregated data;
- Contribute to the development of national convergence strategies between ICT and media in collaboration with governmental agencies;
- Participate in awareness-building activities on social media, their importance and ways of avoiding their negative aspects.

In addition to the above recommendations covering the five clusters adopted in this study, cooperation amongst Arab countries remains essential in enabling the effective utilization of

appropriate digital technologies, in addition to their governance and regulation, in order to reach, by 2030, inclusive and sustainable development that leaves no one behind. The region should also prepare for the future by considering the digital transformation trends, such as big data analytics, artificial intelligence, IoT, and smart cities to develop the expertise needed to advance towards knowledge society.

The report paves the road for a periodical process of stock taking and assessment of the progress towards achieving digital development in the Arab region, and, more importantly, for a fact- and evidence-based national planning process to formulate national digital agendas during 2020, aiming at accelerating and catalysing achievements towards the 2030 Agenda.

Annexes

Annex 1. Selected Digital Technology Projects Geared towards SDGs in the Arab Region

A number of projects based on information and communications technology (ICT) were initiated in Arab countries during the past decade, some of which related to the implementation of the World Summit of the Information Society (WSIS) in the region and turned out to achieve Sustainable Development Goals (SDGs). The following sections present a selection of such projects and discuss them as case studies or success stories to show the impact they achieved or their potential impact on SDGs. They are mostly taken from the Sustainable Development National Voluntary Reviews by Arab countries for 2017 and 2018. The selection criteria were two-fold, namely to be based on ICT or digital technologies and to eventually contribute to some of the SDGs, particularly those in focus in this study, which are SDGs 3, 4, 5, 8, 9, and 17.

These projects and case studies are but a sample of the various initiatives that countries in the Arab region have launched with the aim to accelerate development, use ICT and achieve the SDGs. Since Arab countries are at different stages of development and their financial resources vary from high in the countries of the Gulf Cooperation Council (GCC) to very low in least developed countries (LDCs), the initiatives that are launched are quite different depending on the socioeconomic needs of the countries.

ICT in Education Prize – Bahrain

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

The King Hamad bin Isa al-Khalifa Prize for the Use of ICT in Education of the United Nations Educational, Scientific and Cultural Organization (UNESCO) recognizes innovative approaches in leveraging new technologies to expand educational and lifelong learning opportunities for all, in line with the 2030 Agenda for Sustainable Development and its Goal 4 on education.

Established in 2005 with the support of the Kingdom of Bahrain, the Prize rewards individuals and organizations that implementing outstanding projects and promote the creative use of technologies to enhance learning, teaching and overall educational performance in the digital age.

Each year, an international jury selects two projects. Each prize winner receives \$25,000, a medal and a diploma during a ceremony at UNESCO Headquarters in Paris.

National commissions of the member States of UNESCO and international non-government organizations (NGOs) maintaining official relations with UNESCO are invited to elicit, nominate and submit candidates for the prize, thus contributing to a greater diversity of the projects.

Every year, the prize has a specific theme, which, while being in line with UNESCO's mandate and values, advocates the responsible and ethical use of ICTs. The theme for 2019 is the use of artificial intelligence to innovate education, teaching and learning.

The ICT in Education Prize, although funded by Bahrain, is of international scope and focuses on achieving SDG 4. During the period 2006-2018, 20 laureates were awarded the UNESCO King Hamad bin Isa al-Khalifa Prize for the Use of ICT in Education, three of which were from Arab countries, namely Egypt, Jordan and Morocco, which proves the considerable interest and capability of Arab countries to advance in the area of education using ICT.

ICT Trust Fund – Egypt

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

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

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

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

The Egypt Information and Communication Technology Trust Fund was jointly established by the Ministry of Communications and Information Technology (MCIT) and the United Nations Development Programme (UNDP) in January 2002. Although initiated long before the SDGs were formulated, this project is aligned with at least four Goals, namely Goal 3 on health, Goal 4 on education, Goal 5 on gender equality, and Goal 8 on economic growth and employment.

The ICT Trust Fund is a mechanism that aims to investigate the different means by which ICTs can enrich the livelihood of Egyptian citizens and to foster social, economic and environmental development by creating public-private partnerships to support the use of ICTs.

By empowering communities through access to valuable tools, skills, training, and information, the ICT Trust Fund broadens the horizons of Egyptian citizens and increases their competitive advantage in a modern technological society.

The vision of Egypt's ICT Trust Fund is to empower digital communities. Its mission is to strengthen the impacts of the comprehensive development on citizens' lives using ICTs. It is managed by UNDP in collaboration with MCIT and the Ministry of Foreign Affairs, in line with UNDP's policies and procedures.

It has four objectives, namely to enhance the growth of small and medium-sized enterprises (SMEs) and social entrepreneurs; increase decent employment opportunities for youth; provide integrated health, education, community development, and environment services; and build partnerships and share best practices.

The fund's projects focus on empowering women and youth for employment; developing remote areas, e-learning and telemedicine; and enabling persons with disabilities. A large number of projects have been completed successfully since the establishment of the fund in the various directions of focus, and some of these projects received international and regional awards.

The many successful projects, which have had a considerable impact on the Egyptian society and economy, owe a great deal to the professional management of the trust fund and should serve as role models for other Arab countries and eventually focus on different goals.

Environmental Monitoring Information System – Kuwait

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

The Environmental Monitoring Information System of Kuwait (eMISK) was initiated by the Environment Public Authority (EPA) of Kuwait. It aims to establish, build and maintain a comprehensive geoenvironmental database of Kuwait along with an enterprise-level geographic information system (GIS) for access, update and analysis of environmental data. This geoenvironmental database is made available through eMISK to the decision makers and stakeholders from within EPA, outside agencies and to the public at large, thus contributing to the achievement of SDG 15 related to protecting the environment.

One main objective of eMISK is to develop the skills of the EPA technical staff in order to be able to use, update and present the content of the potential geoenvironmental database. This is planned through intensive on-the-job training, in which eMISK staff would be practically involved in all data preparation, digitization, development, and mapping processes. Among the main goals of eMISK

are to raise awareness at all levels of the Kuwaiti society of the values of the environment and to place authoritative scientific information at the centre of decision-making. eMISK spans over three phases, the first of which covers October 2009 to December 2011 to establish a complete geoenvironmental database for Kuwait. The second phase is aimed at the development of domain-specific environmental models and simulations to help address specific environmental issues in Kuwait. The third and last phase focuses on the development of spatial decision support systems for issues relevant to the environment.

Environmental information can be shared through the Beatona portal, which is intended as a one-stop shop and is expected to play a leading role in raising the awareness of the value of the environment among the residents of Kuwait. A kids' corner and public participation activities are among the planned functions of this web portal.

Among the major contributions of eMISK to Kuwait has been the development of an official environmental portal of Kuwait, called "Beatona" (www.beatona.net). The project was completed at the end of 2012 and has been in use since then. The Beatona portal provides information on the successful use of eMISK and its impact on preserving the environment.

Summer of Innovation – Lebanon

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

SDG 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Launched in the summer of 2017, the Summer of Innovation is Lebanon's platform for innovation, technology, entrepreneurship, and creativity. It is organized and run by IDEAS Accelerate Growth, an NGO striving to transform Lebanon into an innovation nation.

By engaging partners from both the technology ecosystem and its related and supporting industries such as finance, media, academia, and more, the Summer of Innovation platform attempts to connect some of Lebanon's most talented minds with the support system needed to encourage and facilitate organization of events, expose their ideas, and take their concepts to the front end of the country's digital conversation.

Even though the Summer of Innovation is relatively new, the large number of partners involved in the project points to its importance and to the availability of expertise required to make it successful.

United Nation's International Centre of Excellence in Public-private Partnerships for Ports – Lebanon

SDG 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

On 12 May 2017, the International Association of Ports and Harbours (IAPH) decided to set up a World Ports Sustainability Programme to enhance and coordinate sustainability efforts of ports worldwide and foster international cooperation with partners in the supply chain. The United Nations Economic Commission for Europe (UNECE) set up an international Public-private Partnership (PPP) Centre of Excellence that prepares international standards for PPPs which are compliant with the SDGs. As part of this initiative, a series of specialist international centres were established, including one for ports, set up in Beirut and hosted by Lebanon.

The International Centre of Excellence in PPP for Ports will identify PPP best-practice models in ports, establish a digital database and library of all PPP port projects in the world and develop international standards. The centre is supported by the World Bank and the United Nations Conference on Trade and Development (UNCTAD), and ties are being forged with the World Port Sustainability Programme to ensure the involvement of the port sector.

The decision to establish the International Centre of Excellence in PPP for Ports in Lebanon was taken in 2017 and its implementation was expected to follow shortly. Although no information is available on achieved results and the impact on SDG 17, the facts that a number of regional and international organizations are signatories to this project with the commitment to achieve the SDGs and that this PPP model builds on the World Ports Climate Initiative started by IAPH in 2008 and extended to other areas of sustainable development make this a good model to follow.

Science and Technology Park – Qatar

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

SDG 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

The Qatar Science and Technology Park (QSTP) hosts international technology companies and is considered as an incubator of science and technology businesses. It is part of the Qatar Foundation for Research, Development and Innovation and focuses on applied research, technology innovation, incubation, and entrepreneurship. QSTP fosters a vibrant ecosystem that facilitates the

development of new high-tech products and services, supports the commercialization of market-ready technologies and offers state-of-the-art offices and facilities specifically designed for technology-based companies. It contributes mainly to SDGs 9 and 17 as it relates to technology and innovation.

Located in the Qatar Foundation's Education City, QSTP has access to a cluster of leading universities and research centres. Members of QSTP's Free Zone, including international corporations, SMEs and research institutions, are collectively committed to investing in new technology development programmes, creating intellectual property, enhancing technology management skills, and developing innovative new products.

Operating across four overarching themes, namely energy, environment, health sciences, and ICTs, QSTP's programmes and services are designed to support Qatar's drive towards sustainable economic development and diversification.

QSTP is a member of the International Association of Science Parks and Areas of Innovation, an NGO in special consultative status with the United Nations. Top companies joined QSTP since its inception, including EADS, ExxonMobil, General Electric, Rolls Royce, Shell, Total Microsoft, and iHorizons. All tenants are required to make technology development their main activity and provide reasons for success, making great impact on building the knowledge economy of Qatar.

Virtual School in Southern Saudi Arabia

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

In December 2018, the first virtual school for students with special needs was inaugurated in Jazan, Saudi Arabia, by the assistant director of education in the Sabya Governorate. This virtual school is important given the hardships faced by students with special needs to pursue their studies. The school aims to provide an opportunity to all those students with special needs who are otherwise left without school education. The move was part of the efforts of the Ministry of Education to adopt digital technology in the education sector, particularly since Saudi Arabia has pledged to raise its literacy rate from 94.4 to 100 per cent in the near future.

Other virtual schools are being established, providing parents with the opportunity to visit the virtual school and follow up on their children's progress, while increasing the availability of good digital content and adapting to the use of technology in teaching.

The virtual school model offers alternative learning solutions to ensure the dissemination and sustainability of learning, provide learning opportunities for those who cannot reach school, cater to all types of students, and provide virtualized educational services. It provides a high-quality

educational alternative in all regions of the country and compensates for educational losses by allowing students to join their schools online and interact directly with their teachers in virtual classes.

Virtual school projects in Saudi Arabia are quite recent, particularly those dedicated to children with special needs, and their impact has yet to be measured.

Digital Transformation Unit and Economic Growth – Saudi Arabia

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

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

SDG 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Digital transformation is a key pillar of Saudi Arabia's Vision 2030 and affects organizations, processes and systems. By forging partnerships with the private sector, governmental agencies are in the process of developing an advanced digital economy, meaning an economy that operates through digital technology, driven by innovations. As proven agents of change for organizations to reinvent their processes, communication, experience, and overall efficiency, artificial intelligence and analytics lie at the core of this transformation. Its benefits are being felt across all sectors, whether private or public. In particular, automating existing practices and processes through artificial intelligence will allow IT teams to focus more on business innovation, rather than provisioning the IT infrastructure. Moreover, processes can be refactored to leverage relative strengths of both humans and machines to optimize value generation and decision making to increase business agility.

Research carried out by Accenture uncovered that artificial intelligence has the potential to boost economic growth in Saudi Arabia by 1.1 percentage points, adding \$215 billion to the national economy by 2035. The same study states that artificial intelligence will have the greatest impact on the country's manufacturing, public services and professional services industries, with increases of \$37 billion, \$67 billion, and \$26 billion, respectively, in their annual gross value-added, which measures the output value of all goods and services in a sector.

Government agencies have developed a number of programmes and initiatives that contribute to the development of digital content and the digital economy such as the Digital Transformation Unit, which seeks to build a digital society, a digital economy and a digital nation. Digital transformation and the introduction of electronic portals for governmental agencies have been among the top

priorities of Vision 2030. Towards this end, Digital Transformation Unit was set up to accelerate transition to the digital economy, with the aim to improve the quality of services. The unit aims to achieve the Vision's target to position Saudi Arabia as a leading digital country with a diversified economy, through involvement with various governmental and private bodies.

The concept of the Digital Transformation Unit provides an important model to digitize the economy and to lead the way towards economic growth and should help achieve SDGs 8, 9 and 17. Although no evaluation or measurable impact is available, the unit is expected to facilitate government transformation into the digital world, resulting in accelerated growth.

MiSK Foundation – Saudi Arabia

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

MiSK Foundation is a non-profit foundation devoted to cultivate and encourage learning and leadership among youth, providing various means to foster and empower talents, creative potential and innovation while creating a healthy environment for them to grow in. It invests in empowering youth in four pillars of knowledge, namely education, media, culture, and technology, enabling Saudi youth to learn and advance across the business, technological, literary, cultural, and social aspects of the nation.

MiSK Foundation pursues these goals by establishing programmes and partnering with local and global organizations in diverse fields. Through a variety of incubators, MiSK is accelerating the development of the intellectual capital and unleashing the potential of Saudi youth. Hence, it is establishing a knowledge-based society, which will add value to the Saudi society. The guiding principles of the foundation towards these objectives are commitment, impact and integrity.

In particular, MiSK focuses on change through innovation and technology, seeking to enable youth to become creative and to acquire a leading position in the creation and development of ideas. It supports people with creative digital capabilities and digital entrepreneurs, with emphasis on five technologies, namely cloud computing, big data, IoT, artificial intelligence, and computer programming. The initiative "Saudi Arabia is Programming" enabled more than 300,000 young men and women in coding, in cooperation with 4,411 trainers in more than 100 cities, over a time span of 30 days. Saudi Arabia was ranked fourth worldwide in activation of the Hour of Code in terms of participants' performance and interaction with the event. Aiming at enriching digital content and the creative digital scene, MiSK enables youth to gain knowledge and skills in digital and social media. These initiatives have had an immense impact on achieving SDGs in general and SDG4 in particular.

National Innovation Strategy – United Arab Emirates

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

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

In October 2014, the United Arab Emirates' National Innovation Strategy was launched with the aim of making the country, within seven years, one of the most innovative nations in the world by setting the overall direction of the science, technology and innovation policy and realizing the country's Vision 2021.

This strategy consists of four tracks. The first track will establish a stimulating environment for innovation in the form of supportive institutions and laws. The second track will develop governmental innovation by institutionalizing innovative practices with the support of an integrated system of modern tools. The third track will encourage private-sector innovation by stimulating companies to establish innovation and scientific research centres, adopt new technologies and develop innovative products and services. The fourth track will endow individuals with highly innovative skills by focusing on science, technology, engineering, and mathematics, including the creation of educational material for schools and universities.

The framework for the strategy is structured around the following three key pillars: (a) an innovation-enabling environment leading to comprehensive enabling services, enhancing the technology infrastructure and ensuring the availability of investments and incentives; (b) innovation champions such as individuals, companies, institutions, and government agencies; (c) seven innovation priority sectors to be stimulated for innovation, comprising renewable energy, transport, education, health, technology, water, and space.

The United Arab Emirates National Innovation Strategy, launched in 2014 before the SDGs were adopted, can be seen as striving to achieve SDGs 8 and 9. It is a rare national strategy that focuses on innovation, which is usually part of a science and technology strategy. Its three pillars, the investment and legal environment, the people and companies, and seven sectors that are most in need of innovation to flourish, are well selected to reach its goals and make the United Arab Emirates the most innovative country both at the regional and the global levels. However, its positive impact on the economy may require some time before it can be demonstrated.

Techno Care and Maker's Space – Kuwait

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

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

Project Techno Care is based on the start-up HealthTech launched by two women entrepreneurs and aims to increase the quality of life for patients with disabilities and their caregivers by developing applications for wearable devices and mobile phones. Another success story called Idea Space was launched by an electrical engineer with a passion for robotics and technical fabrication and led to Maker's Space, which focuses on research, innovation and novel product development and fabrication.

Shamra Search Engine – Syrian Arab Republic

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

SDG 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Shamra is a search engine developed and launched in the Syrian Arab Republic in 2015 by an emerging company and a group of young entrepreneurs. The engine includes a set of more than 15 applications and services offered through the platform, which allows businesses to invest in digital advertising and reach a larger audience. It includes the largest digital business directory in the country featuring more than 16,000 economic entities. The Jobs application provides a platform to connect business seekers to job opportunities. An agreement was signed with the Ministry of Social Affairs and Labour at the beginning of 2019 to use the platform data and Jobs application in the job-seeking training programmes organized by the ministry. Shamra was recently selected as the best digital business and e-commerce project in the World Summit Awards 2019 held in Lisbon, Portugal.

Connectivity for Gamma Zones Project – Tunisia

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

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

Digital infrastructure development is one of the four pillars of the Tunisian national strategy Digital Tunisia 2020, under the context of addressing the digital divide between regions and boost economic activities in remote areas thanks to the broadband connection to the Internet. The Connectivity for Gamma Zones project was conducted to connect 94 poor connectivity delegations in 15 governorates of the Tunisian territory to a high-speed network and to provide 164 schools and 59 basic health facilities with telecommunications services. 180,000 inhabitants have so far benefited from this project, which also gave students in schools in disadvantaged regions the opportunities to gain access to knowledge and digital educational content.

Start-up Act – Tunisia

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

As part of efforts to strengthen the business community in Tunisia, and particularly the ICT sector, the Tunisian Government developed, in a participatory and collaborative way including all the stakeholders of the entrepreneurial ecosystem in Tunisia across the Ministry of Communication Technologies and Digital Economy, an unprecedented legal framework dedicated to start-ups. The Start-up Act is a law that provides a series of incentives and benefits to encourage potential entrepreneurs to launch their start-ups and encourage investors to financially support them, with the goal to create national and international champions.

Annex 2. WSIS Action Lines

1. The role of governments and all stakeholders in the promotion of ICTs for development
 - Cooperation among stakeholders • Millennium Declaration • Mainstreaming ICTs • Multi-stakeholder partnership (MSP) • Multi-stakeholder portals for indigenous peoples • National e-strategies • Public-Private partnerships (PPP).
2. Information and communications infrastructure: an essential foundation for an inclusive information society
 - Access • Accessibility • Affordability • Assistive technologies • Broadband network infrastructure • Digital inclusion • Enabling and competitive environment • ICT backbone • ICT connectivity • ICT equipment • ICT services • Infrastructure • Internet exchange points • Investment • Satellite • Traditional media • Remote and marginalized areas • Ubiquitous computing/communications • Universal access/service • Wireless.
3. Access to information and knowledge
 - Access to public official information • Access to scientific knowledge • Digital public libraries and archives • ICTs for all • Multi-purpose community public access points • Open source, proprietary and free software • Public access to information • Public domain information.
4. Capacity-building
 - Basic literacy • Distance learning • Education/training • E-literacy • Gender • Combating illiteracy • Life-long learning • Research and development • Self-learning • Teacher training • Training ICT professionals • Volunteering • Youth.
5. Building confidence and security in the use of ICTs
 - Authentication • Building confidence and security • Consumer protection • Countering misuse of ICTs • Countering spam • Cybercrime • Cybersecurity • Data protection • Information security and network security • Network integrity • Online transaction security • Privacy • Real-time incident handling and response • Secure and reliable applications.
6. Enabling environment
 - Consumer protection • Dispute settlement • Domain-name management • E-commerce • E-government strategy • Entrepreneurship • ICT forums • Intellectual property • Internet governance • Legal, regulatory and policy environment • Privacy • Radio frequency spectrum • Regional root servers • Secure storage and archival • Small and medium-sized enterprises (SMEs) • Standardization.

7. ICT applications: benefits in all aspects of life
 - Disaster recovery • E-applications • E-agriculture • E-business • E-commerce
 - E-employment • E-environment • E-government • E-health • E-publishing • E-science
 - ICT waste disposal • Sustainable production and consumption • Teleworking • Transparency.
8. Cultural diversity and identity, linguistic diversity and local content
 - Cultural diversity • Cultural exchange and information • Cultural heritage • Cultural industry • Cultural policy • Digital archive • Disadvantaged and vulnerable groups • Indigenous peoples • Internationalized domain names • Language-related ICT tools • Linguistic diversity • Local languages • Traditional knowledge.
9. Media
 - Combatting illegal and harmful content in the media • Diversity of media ownership • Gender portrayal in the media • Media independence and pluralism • Reducing international imbalances • Role of media in the information society • Traditional media • Training of media professionals.
10. Ethical dimensions the information society
 - Common good • Ethics • Human rights • Preventing abusive uses of ICTs • Values.
11. International and regional cooperation
 - Financing of ICT networks and services • Infrastructure development projects • International mechanisms • Progress evaluation • Regional action plan • United Nations global compact.

Note: The information contained in annex 2 was taken from ITU, n.d.c.

Annex 3. The 2030 Agenda Sustainable Development Goals



- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all

- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 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
- Goal 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
- Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

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Endnotes

Preface

1. See <https://sustainabledevelopment.un.org/hlpf/2019>.

Executive Summary

2. SDG 4: quality education; SDG 8: decent work and economic growth; SDG 9: industry, innovation and infrastructure; SDG 10: reduced inequalities; SDG 13: climate action; SDG 16: peace, justice and strong institutions; SDG 17: partnerships for the goals.
3. Iraq, Jordan, Kuwait, Mauritania, Oman, State of Palestine, Sudan, Syrian Arab Republic, Tunisia, and United Arab Emirates.

Introduction

4. A/RES/70/1.
5. A/RES/70/125.
6. The alignment of WSIS and sustainable development entails that the review of its implementation in 2025 would feed into the process of the 2030 Agenda for Sustainable Development.
7. United Nations, 2016b.
8. United Nations, 2018.
9. See <https://www.unescwa.org/sites/www.unescwa.org/files/events/files/beirut-consensus-ahlf2017-en.pdf>.
10. United Nations, n.d.
11. E/ESCWA/TDD/2015/3.
12. E/ESCWA/TDD/2017/3.

Chapter 1

13. United Nations Conference on Trade and Development, 2019, pp. 69 and 90.
14. World Bank, n.d.
15. Newman, 2018.
16. Kemp, 2019.
17. Internet World Stats, n.d.
18. Kemp, 2019.
19. Ericsson, 2018.
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27. Salem, 2017a.
28. Salem, 2017a.

29. Ibid.
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Chapter 2

31. See <http://oman.om/wps/portal/index/EmergingTechnologies/?lang=en>.
32. <http://www.uaesai.ae/en>.
33. Jordan, Ministry of Information Communications and Technology, n.d.
34. See <http://family.scs.org.sy>.
35. United Nations Economic and Social Commission for Western Asia, n.d.
36. Total Impact, 2018.
37. See <http://www.igppp.tn>.
38. الكويت، 2015.
39. الكويت، 2014.
40. الكويت، 2016.
41. Kuwait, Communication and Information Technology Regulatory Authority, 2017.
42. دولة فلسطين، 2017، 2017ب.
43. Tunisie, Imprimerie Officielle de la République Tunisienne, 2016.
44. Article 31 of the Constitution provides for a general right of “freedom of corresponding through the post, telegraph or other means of communication and the secrecy thereof shall be guaranteed in accordance with the law”.
45. See <https://cert.gov.om>.
46. الكويت، 2014.
47. See <https://www.sas.om/SASEN/Pages/Home.aspx>.
48. UNESCO Institute for Statistics, 2016.
49. Innovative Jordan, n.d.
50. See www.cnc.gov.mr.
51. One example of such private sites is available at www.beta.mr.
52. See <http://anapej.org>.
53. See <https://www.gpc.pna.ps>.
54. See www.lmis.pna.ps/AboutLMIS.aspx.
55. See <https://shamra.sy/jobs/>.
56. See www.emploi.nat.tn.
57. See www.concours.gov.tn.
58. One such counselling service is available at www.sosfemmesviolences.tn.
59. The portal is available at <http://www.e.gov.kw>.
60. Jordan, Ministry of Information Communications and Technology, n.d.
61. See <http://www.moe.gov.jo/ar/poll>.
62. See <https://www.ammancity.gov.jo/ar/gam/result.as>.
63. See <https://www.moh.gov.om/en/-38>.
64. See <https://www.ita.gov.om/ITAPortal/MediaCenter/NewsDetail.aspx?NID=60812>.
65. See Omanuna, The Open Data.
66. See <http://www.tunisie.gov.tn>.
67. United Arab Emirates, n.d.
68. See <http://www.cims.rns.tn>.
69. See www.nl.gov.jo.
70. See <https://nraa.gov.om/english>.
71. See <http://www.agendaculturel.gov.tn>.

72. See www.patrimoinedetunisie.com.tn.
73. See <http://www.inp.rnrt.tn>.
74. See www.cmc.iq.
75. Salem, 2017b.

Chapter 3

76. Huawei, 2017.
77. The six SDGs are as follows: SDG 3 on good health and well-being, SDG 4 on quality education, SDG 5 on gender equality, SDG 9 on infrastructure, industrialization and innovation, SDG 11 on sustainable cities and communities, and SDG 13 on climate action.
78. The 15 countries are China, Colombia, Egypt, Germany, India, Indonesia, Kenya, Mexico, Pakistan, Singapore, Sweden, Singapore, Thailand, United Arab Emirates, United Kingdom, and United States of America.
79. Huawei, 2017.
80. United Arab Emirates, Saudi Arabia, Jordan, Morocco, Algeria, and Egypt (listed according to their decreasing performance benchmark).
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82. Economist Intelligence Unit, 2019b.
83. Manyika and others, 2013.
84. World Bank, 2016.
85. Chakravorti, Tunnard and Chaturvedi, 2014.
86. E/ESCWA/TDD/2017/2.
87. Dean, 2017.
88. United Nations Conference on Trade and Development, 2019.
89. Mustafa, 2019.
90. Ibid.
91. See <https://www.epatientdave.com/2016/01/07/its-time-to-adopt-a-good-working-definition-of-empowerment/>.
92. World Bank, 2018.
93. World Bank, 2016.



Linking the role of information and communications technologies (ICTs) with sustainable development, this publication addresses the theme of empowering people and ensuring inclusiveness of societies, leaving no one behind. The publication examines the existing digital transformations and emerging technologies and their central role in the future of digital development, with a special focus on the multidimensional synergy between digital technologies and various strategic and socioeconomic policy areas. Through a regional assessment, the publication evaluates the digital progress and identifies gaps and policy options for enabling digital transformation towards sustainable development. Growing digital technologies in the Arab region and potential developmental challenges are also addressed, together with the proposed policy measures that could allow governments and relevant stakeholders to overcome these challenges and benefit from ICTs and digital transformations.

The publication is based on the National Digital Development Reviews received from the member countries participating in the national review exercise and contributions of experts in various areas. It addresses implications of digital technologies on various sectors of the economy and sustainable development. The thematic areas covered are in line with the global trends addressing the linkages of digital technologies with sustainable development and particularly with the periodically identified themes of the High-level Political Forum (HLPF) of the United Nations Economic and Social Council (ECOSOC). Hence, this edition of the report provides a review of digital development in the Arab region, with an eye on the theme of empowering people and ensuring inclusiveness of societies in line with the HLPF theme for 2019.

