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Regional Profile of the Information Society in the Arab Region

2003-2015

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The Economic and Social Commission for Western Asia (ESCWA) has published the present study every two years since 2003 to follow-up on the implementation of the outcomes of the World Summit on the Information Society (WSIS). The present issue of the study, entitled *Regional Profile of the Information Society in the Arab Region 2003-2015*, summarizes progress towards developing an information society in the Arab region, in accordance with the action lines contained in the WSIS outcome documents. This issue also evaluates the strengths and weaknesses of the information society in the region, and sets out proposals and recommendations for its advancement and for achieving sustainable economic and social development in the region.

The ESCWA Technology for Development Division conducted the present study under its programme of work for the biennium 2014-2015. It was prepared by a team composed of experts from the Arab region and from ESCWA. Ms. Nibal Idlebi, Chief of the Innovation Section, oversaw preparations and work carried out by the ESCWA team comprising Mr. Rami Zaatari, Head of the Dissemination and Communication Unit of the Statistics Division; and Ms. Hania Sabbidin Dimassi, Ms. Lize Denner and Mr. Yasser Karout of the ESCWA Technology for Development Division, under the supervision of Mr. Haidar Fraihat, Director of the Technology for Development Division.

The present study draws upon a specialized report prepared by Mr. Mansour Farah, an expert in information society policies and strategies; and Mr. Imad al-Sabouni, an expert in information and communication technology policies and strategies. Their report contained a summary and analysis on the development of an information society in the Arab region over the period 2003-2013.

ESCWA conducted a peer review of the present study, in which several ESCWA experts participated alongside two other experts, namely Mr. Abdulilah Dewachi, a regional consultant on information and communication technology policies; and Mr. Youssef Nusseir, an expert in information society policies and strategies.

ESCWA would like to thank its member States for their cooperation over the past 10 years in providing data and information on the status of the information society within their borders, which contributed to the preparation of the present study. ESCWA welcomes any comments from member States, to be sent by electronic mail to the following address: escwa-tdd@un.org.

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Introduction

An "information society" is a society where the creation, management and exchange of information is significant to achieving economic and social development and to improving living standards and working conditions. In this society, information and communication technologies are used to drive change in all aspects of society, economy, trade, culture, education, health care, science, technology and policy towards a knowledge-based economy.

At the start of the twenty-first century, the digital divide began growing between developed and developing countries and now poses a direct threat to the latter, which have been marginalized, impoverished and excluded from the global economy. Consequently, the General Assembly of the United Nations issued a resolution in December 2001 on holding the World Summit on the Information Society (WSIS) over the following two phases: the first in Geneva from 10 to 12 December 2003, and the second in Tunis in 2005. The Summit considered measures to reduce the digital divide and assist developing countries in building information societies. The first phase resulted in two outcome documents, namely the Geneva Declaration of Principles[1] and the Geneva Plan of Action.[2] The second phase focused on implementing the Plan of Action, identifying funding mechanisms for employing information and communication technologies in the development process, addressing Internet governance issues, and following up on decisions issued during the first WSIS phase.

In 2003, ESCWA began preparing reports on national profiles of the information society in its members States and on the information society in the Arab region. The series of reports entitled Regional Profile of the Information Society in the Arab Region, published every two years, aims to monitor and evaluate all aspects of the information society in the region and to measure progress towards its achievement.[3] The series contains a comprehensive analysis of information society issues in line with the WSIS action lines, excluding the action line on the ethical dimensions of the information society. The series also covers strengthening the information and communication technology (ICT) sector, which is of special importance to the Arab region.

To date, the series comprises six studies published in 2003, 2005, 2007, 2009, 2011 and 2013. The present 2015 report on the period 2003-2015 aims to review the regional profile of the information society for that period, asses its status in 2015 and develop a vision for the Arab information society beyond 2015.

The above-mentioned General Assembly resolution tasks several United Nations entities, led by the International Telecommunication Union (ITU) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), to follow up on key issues including implementing WSIS outcomes, building a global information society and reducing the digital divide between developing and developed countries.[4] Moreover, the Geneva Plan of Action sets out development goals agreed at WSIS, building on the Millennium Development Goals.[5] Several international measures have been taken to implement these goals and many reports have been prepared on the topic, the most recent of which was published in 2015.[6]

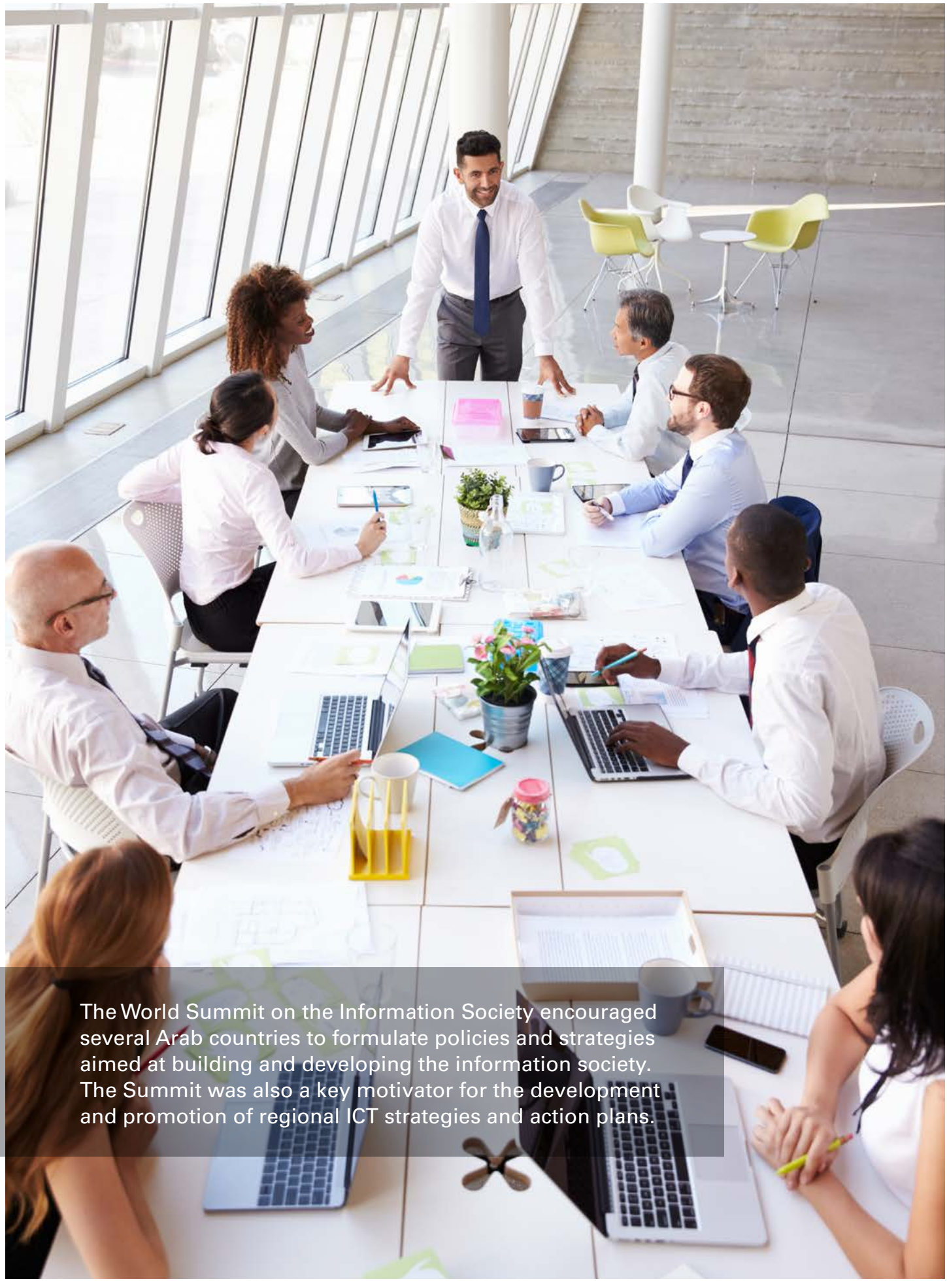
More than 10 years after the first WSIS phase, developing countries have witnessed social and economic improvements as the deadline for achieving the Millennium Development Goals approaches; it is therefore necessary to reassess the Summit's achievements, review its Plan of Action and identify new priorities related to the sustainable development goals. For this reason, United Nations organizations, in collaboration with Governments, the private sector and civil society, conducted a year-long review resulting in new priorities[7] within the framework of the Geneva action lines. Annex I to the present report sets out the international priority areas that the post-2015 WSIS outcomes should be based upon. Some of these priorities overlap with the Geneva action lines and others with the general principles of human development.

The present study reviews the key features of the information society in the Arab region and assesses progress towards its achievement and development over the period 2003-2015. It also evaluates the information society and the digital economy post-2015, taking into account the sustainable development goals. This study is divided into 11 chapters. The first 10 chapters cover the action lines of the Geneva Plan of Action, and the last chapter evaluates the status of the information society in the Arab region in the light of the sustainable development goals. The study concludes with a set of recommendations to strengthen progress towards building an information society in the Arab region.

Policymakers in Arab countries can refer to the present study for guidance in formulating policies and strategies to strengthen the information society; in launching national and regional initiatives and projects to promote innovation and improve technology and scientific research towards a knowledge-based economy; and in reducing the digital and knowledge divide between ESCWA member States and between the Arab region and the rest of the world.

The present study is composed of the following chapters:

Chapter 1: Information and communication technology policies and strategies;
Chapter 2: ICT infrastructure;
Chapter 3: Access to information and knowledge;
Chapter 4: ICT capacity-building;
Chapter 5: Building confidence and security in the use of ICT;
Chapter 6: Enabling environment;
Chapter 7: ICT applications;
Chapter 8: Cultural diversity and identity, linguistic diversity and local content;
Chapter 9: Building the ICT sector;
Chapter 10: Regional cooperation in building the information society;
Chapter 11: The 2030 Agenda for Sustainable Development and the knowledge society in the Arab region.



The World Summit on the Information Society encouraged several Arab countries to formulate policies and strategies aimed at building and developing the information society. The Summit was also a key motivator for the development and promotion of regional ICT strategies and action plans.

I. Information and communication technology policies and strategies

Before the first WSIS phase, held in Geneva in 2003, there were very few Arab countries that had developed ICT policies and strategies or allocated budgets for that purpose. Instead, most Arab countries were focused on the telecommunications sector that was proving highly lucrative. However, following their participation in the first WSIS phase and in the preparations for the second phase, held in Tunis is 2005, Arab countries adopted a serious stance towards ICT policy formulation. They began viewing the ICT sector from a development perspective, given that it complemented the communications sector to the point where they could be combined. Arab countries also started focusing on reducing the digital divide, building an inclusive information society and employing ICT to achieve development goals, especially the Millennium Development Goals. They established national entities, primarily ICT ministries, whose main responsibility was to develop and follow up on the implementation of ICT policies and strategies towards an information society.

A. ICT policies in Arab countries: an overview

WSIS encouraged several Arab countries to formulate policies and strategies aimed at building and developing the information society, and to amend some strategies adopted before the Summit. WSIS was also the key motivation for the development of the Arab ICT Strategy: Building the Information Society 2007-2012. Committees and teams under the Arab Telecommunications and Information Council of Ministers, ESCWA and other regional and international organizations contributed to its formulation.

Before the first WSIS phase, Egypt had already realized the importance of ICT in achieving economic and social development. Consequently, it established the Ministry of Communications and Information Technology in 1999 and developed national strategies and plans to disseminate the technology, ensure its effective use and establish related research centres, incubators, technology parks and industrial clusters. Jordan was also one of the first Arab countries to develop, in 2002, a national ICT strategy,[1] adopted following a private sector initiative by the Information and Communications Technology Association of Jordan (Int@j). The strategy aimed to develop the ICT sector and place Jordan among countries exporting software and other related products. Although the United Arab Emirates has not formulated an official national ICT strategy, a number of its emirates, led by Dubai, have identified clear goals for the telecommunications sector and have heavily invested in it, thus speeding up their economic development.

The ICT sector changed following WSIS. Preparations for regional and international discussions on the Summit highlighted the importance of building an information society. As a result, Arab countries saw the need to develop national strategies for an information society by formulating ICT sectoral policies. However, although many Arab countries rushed to develop these policies, implementation rates varied because of differing national priorities, political situations and resource availability. By 2009, most countries had developed some form of national ICT strategies and policies, but implementation was sometimes problematic because of delays in setting implementation plans, a lack of

funding, weak political will and knowledge, and social, political and economic crises.

The 2005 Egyptian Information Society Initiative resulted in a national ICT vision for 2020. It identified measures for achieving an information society, and highlighted the need to lift regulatory restrictions imposed on the sector and to include the private sector in ICT regulation and development. Proposed measures to build the information society included providing computers, establishing ICT technology parks, modernizing wired and wireless communication networks, offering affordable e-services, developing e-learning, digitizing heritage, strengthening ICT export manufacturing, and enhancing the role of research and innovation in the economy.

Jordan developed a national ICT strategy 2007-2011 following the implementation of its REACH initiative in 2008, which set out priorities, goals and achievement indicators related to the ICT sector. The initiative stressed the importance of public-private partnerships, and focused on competitiveness, research and development and e-commerce.

In 2005, the United Arab Emirates set out and implemented a transition plan towards an information society, and ranked among the top Arab countries in international indicators on network readiness, digital opportunity and ICT use. Under the plan, the United Arab Emirates established Dubai Internet City and Dubai Media City containing Knowledge Village, making the country a centre of innovation in the Arab region.

Bahrain and Qatar made good progress towards building an information society after WSIS by developing and implementing relevant policies and strategies. In 2007, Bahrain launched its Internet governance strategy; several government administrations, private sector entities and experts contributed to its development. In 2008, Bahrain formulated its second national telecommunications plan and fully implemented it under the supervision of the Central Informatics Organization. In 2012, it launched its third national telecommunications plan under the close management of the Telecommunications Regulatory Authority of Bahrain.

In 2004, Qatar established the Supreme Council of Information and Communication Technology, tasked with developing regulatory policy for the ICT sector and with creating an enabling environment, including telecommunications liberalization. The Council put in place a national strategy comprising 12 development programmes that remain under implementation since their review in 2011. In 2013, the Ministry of Information and Communications Technology replaced the Supreme Council. In 2016, the Ministry was renamed the Ministry of Transport and Communications.

Over the past 10 years, some countries have developed and implemented e-policies, namely Kuwait, Oman and Saudi Arabia. The Saudi Ministry of Communications and Information Technology prepared a national ICT strategy in 2007, after outlining a future vision and implementation plan towards an information society and knowledge-based economy. The strategy also set out plans to implement e-government transactions. It was updated in 2013 and is still being implemented under the supervision of the Ministry of Communications and Information Technology. In Oman, the Information Technology Authority began implementing its first strategy on the information society in 2003 entitled "Electronic Oman", aimed at improving e-government services, developing the ICT sector and increasing youth employment opportunities.

In 2005, Kuwait adopted a national strategy on building an information society, implemented by the Central Agency for Information Technology. The strategy came under the five-year national plan 2009-2014 and focused on improving e-services, ensuring an enabling environment, broadening the

range of electronic applications in health care and education, and strengthening the role of the private sector. Kuwait also formulated a medium-term development plan from 2015-2016 to 2019-2020, adopted pursuant to law No. 9/2010. The plan approved support policies for the ICT sector and developed ICT products, networks and services.

In 2013, the Tunisian Ministry of Higher Education, Scientific Research and Information and Communication Technologies launched an ICT national strategic plan entitled "Digital Tunisia 2018", aimed at using digital technology to drive development in several fields, including health care, education and tourism. The plan covers telecommunications infrastructure, e-management, e-transactions, remote services, offshore outsourcing of services, research and development, and digital technology uses.[2]

Between 2002 and 2004, the Syrian Arab Republic developed a national ICT strategy and included several of its items in its tenth five-year national plan 2006-2010 and in its eleventh five-year plan, including items on training highly-skilled cadres, making a qualitative step in ICT infrastructure and in expanding the Internet, restructuring and regulating the telecommunications sector, developing the ICT sector, creating an e-government portal, and promoting direct foreign investment. The Ministry of Communication and Technology followed up on the strategy's implementation until 2011 when unrest and infrastructure damage forced the Ministry to give priority to rebuilding and maintaining existing networks and to meeting more urgent needs, thus impeding the strategy's activities.

Lebanon prepared its electronic strategy in 2002, under the supervision of the Office of the Minister of State for Administrative Reform and with the participation of several ministries. However, the strategy, which included clear and realistic goals, was not officially adopted because of the political situation at the time. It was updated in 2008 and a study was conducted to evaluate its feasibility. Consequently, some development projects were launched in collaboration with the private sector and a national broadband plan was implemented. However, delays in adopting the national strategy have slowed the implementation of other plans and projects. In July 2015, the Ministry of Telecommunications launched its five-year plan entitled "Lebanon 2020 – Digital Telecom Vision" to improve infrastructure for Internet and mobile networks in preparation for fifth generation (5G) telecom technologies in 2020.[3]

In 2004, the Palestinian Ministry of Telecommunications and Information Technology adopted a national ICT strategy that focused on building and liberalizing a local ICT sector, and on launching the 2006 e-learning initiative to develop curriculums, train teachers and generate e-learning content. It also stressed the need to regulate the telecommunications sector by licensing voice over Internet protocol (VoIP) and broadband services, and to implement Internet governance.

In Iraq, the development of an ICT strategy was delayed until 2009-2010 because of the severe instability that has been affecting the country for over 10 years. The strategy, whose adoption was also significantly delayed, focused on liberalizing telecommunications, rebuilding telecommunications infrastructure destroyed during and after the war, developing government services and expanding the use of information technologies.

Sudan adopted its ICT strategy in 2007; the National Information Centre follows up on its implementation. The strategy aims to move towards the information society by disseminating ICT, providing access to all, increasing employment opportunities and building technological capacity. Satisfactory progress has been made in its implementation.

Table 1.1. National ICT strategies in selected Arab countries

Country	Adoption year of first strategy	Tile of first strategy	Responsible body	Title of second strategy	Responsible body	Tile of latest strategy	Responsible body	Implementation progress
Algeria	-	-	-	-	-	Electronic Algeria 2013	Ministry of Post, Communications and Information Technology	Limited
Bahrain	2001	National Telecommunications Plan	Central Informatics Organization	Second National Telecommunications Plan	Central Informatics Organization	Third National Telecommunications Plan	Telecommunications Regulatory Authority	Excellent
Egypt	2000	National Telecommunications Plan	Ministry of Communications and Information Technology	Egypt ICT Strategy 2007-2010	Ministry of Communications and Information Technology	Egypt ICT 2020 Strategy	Ministry of Communications and Information Technology	Fair
Iraq	2009	-	Ministry of Communications	ICT Strategy 2009-2010	Ministry of Municipalities and Public Works	No public policy because a group of public sector entities adopt various ICT strategies	Group of ministries, municipalities and public work entities (health, interior affairs, communications)	-
Jordan	2000	Reach	ICT private sector (Int@j)	National ICT Strategy 2007-2011	Ministry of Information and Communications Technology	National ICT Strategy 2011-2017	Ministry of Information and Communications Technology	Good
Kuwait	2005	National Strategy for Building an Information Society	Central Agency for Information Technology	-	-	National Strategy for Building an Information Society	Central Agency for Information Technology	Good
Lebanon	2003	National Broadband Strategy	Office of the Minister of State for Administrative Reform	National Electronic Strategy	Presidency of the Council of Ministers	Lebanon 2020 – Digital Telecom Vision	Ministry of Telecommunications	-
Libya	2013	-	Ministry of Communication and Informatics	-	-	Libya Electronic Initiative	Ministry of Communication and Informatics	-
Morocco	-	-	-	-	-	Digital Morocco 2013 (in 2009)	Ministry of Industry, Commerce and New Technologies	Good

Country	Adoption year of first strategy	Tile of first strategy	Responsible body	Title of second strategy	Responsible body	Tile of latest strategy	Responsible body	Implementation progress
Oman	2002	Oman Digital Strategy	Information Technology Authority	-	-	Oman Digital Strategy	Information Technology Authority	Good
Palestine	2004	National ICT Strategy	Ministry of Communications and Information Technology	-	-	National ICT Strategy 2013-2015	Ministry of Telecommunications and Information Technology	Limited
Qatar	2005	-	Supreme Council of Information and Communication Technology	-	-	National ICT Strategy 2015: Qatar Digital Agenda	Ministry of Information and Communications Technology	Excellent
Saudi Arabia	2002	-	Ministry of Communications and Information Technology	-	-	National ICT Plan	Ministry of Communications and Information Technology	Good
Sudan	2007	-	-	-	-	National Strategy for the ICT Sector	National Information Centre	Fair
Syrian Arab Republic	2004	National ICT Strategy for Socio-Economic Development	Ministry of Communications and Technology	National ICT Strategy for Socio-Economic Development	Ministry of Communications and Technology	National ICT Strategy for Socio-Economic Development	Ministry of Communications and Technology	Limited
Tunisia	-	-	-	-	-	National ICT Strategic Plan (Digital Tunisia 2018)	Ministry of Higher Education, Scientific Research and Information and Communication Technologies	Fair
United Arab Emirates	No national ICT strategy or policy	Each Emirate has its own strategy or policy	Authorities in each emirate	ICT Public Policy 2006-2010	Telecommunications Regulatory Authority	ICT Public Policy 2011-2015	Telecommunications Regulatory Authority	Excellent
Yemen	2008	-	National Information Centre	-	-	National Information Policy	National Information Centre	Limited

Source: ESCWA.
Note: Implementation progress is self-evaluated by the country's responsible body, as received in national profiles.

Yemen finished formulating its national ICT strategy in 2007-2008. It was formally adopted in 2011 but its implementation has been hampered by political unrest and instability.

B. Maturity levels of policy and strategy in selected Arab countries

Selected Arab countries can be divided into the following four categories, according to policy and strategy maturity for the period 2003-2013 (table 1.2)

Maturity level 1: countries that lack a clear national ICT vision or strategy and implementation plan (or have a weak plan), and with few public-private partnerships.

Maturity level 2: countries with a national ICT vision or strategy, but that lack an implementation plan (or have a weak plan), and weak public-private partnerships.

Maturity level 3: countries with a clear national ICT vision or strategy, effective implementation plans, and multi-party and public-private partnerships.

Maturity level 4: countries with a clear national ICT vision or strategy and strong political will to implement it; effective implementation plans and coordinated efforts resulting in good results; and numerous successful multi-party and public-private partnerships.

Table 1.2. ICT policy and strategy maturity levels in selected Arab countries

Country	2003	2005	2007	2009	2011	2013	2015
Bahrain	2	4	4	4	4	4	4
Egypt	2	3	3	3	3	2	3
Iraq	1	1	1	1	1	1	1
Jordan	3	4	3	3	3	3	3
Kuwait	2	3	2	3	3	3	3
Lebanon	1	2	2	2	2	2	3
Libya	-	-	-	-	-	1	1
Morocco	-	-	-	-	-	3	3
Oman	2	2	2	2	3	3	3
Palestine	1	1	1	1	1	1	1
Qatar	2	2	4	4	4	4	4
Saudi Arabia	1	2	3	3	3	3	4
Sudan	-	-	-	2	2	2	2
Syrian Arab Republic	1	2	2	2	2	2	2
Tunisia	-	-	-	-	-	3	3
United Arab Emirates	3	3	4	4	4	4	4
Yemen	1	1	1	1	2	2	2
Regional average	1.7	2.3	2.5	2.5	2.6	2.5	2.7

Source: ESCWA.

C. Conclusion

Strategies and policies on ICT and on building an information society in the Arab region have several strengths and weaknesses.

1. Strengths

- Most Arab countries have the necessary capacity for developing national ICT strategies and policies
- Public-private partnerships support strategy formulation.

2. Weaknesses

- Weak relationship between developing and implementing strategies
- Lack of harmony between strategies and national priorities in most Arab countries, and weak cooperation between countries
- Lack of a participatory approach between national bodies tasked with implementing ICT plans and projects
- Lack of practical indicators and accurate timely and transparent data used by monitoring and follow-up systems
- Lack of homogeneity between working methods employed by various sectors implementing ICT strategies and relevant action plans, and weak coordination between them.

3. Recommendations

- Enhance cohesion between national strategies and implementation plans, on the one hand, and national priorities and economic situations, on the other, and increase opportunities to achieve these strategies and plans through partner cooperation in their implementation
- Conduct periodical reviews of national visions for an information society and of ICT strategies to ensure consistency with emerging national priorities, and to ensure coherence between strategies and action plans
- Develop monitoring and measurement tools to evaluate the effectiveness and impact of national ICT strategies.

Most Arab countries have attempted to improve their ICT infrastructure and to encourage competitiveness in the telecommunications sector. A significant positive correlation exists between the liberalization of telecommunications services and increases in access to ICT and mobile phone and Internet penetration levels.

2. ICT infrastructure

ICT infrastructure is vital to building the information society and ensuring digital cohesion, and to the availability of comprehensive, sustainable and affordable ICT services. In the Arab region, ICT infrastructure has rapidly developed with the emergence of new generations of mobile networks and faster Internet speeds on both fixed and mobile networks. These developments are the result of progress and increased competitiveness in the telecommunications sector. In view of this evolving situation, policies developed by ministries and telecommunications regulatory bodies must keep pace so as to provide services that meet changing user needs.

A. Structure and regulatory environment of the telecommunications sector

The past years have witnessed steady changes in the structure of the telecommunications

Table 2.1. Telecommunications regulatory bodies in the Arab region, 2015

Country	Body	Establishment/re-establishment date
Algeria	Autorité de Régulation de la Poste et des Télécommunications	2000
Bahrain	Telecommunications Regulatory Authority	2002
Egypt	National Telecom Regulatory Authority	2003
Iraq	Communications and Media Commission	2004
Jordan	Telecommunications Regulatory Commission	1995
Kuwait	Communications and Information Technology Regulatory Commission	2014
Lebanon	Telecommunications Regulatory Authority	2007
Libya	General Telecommunications Authority	2006
Morocco	Agence Nationale de Règlementation des Télécommunications	1996
Oman	Telecommunication Regulatory Authority	2002
Palestine[a]	Ministry of Telecommunications and Information Technology	..
Qatar	Communications Regulatory Authority	2014
Saudi Arabia	Communications and Information Technology Commission	2004
Sudan	National Telecommunication Corporation	1996
Syrian Arab Republic	Telecommunication Regulatory Authority	2010
Tunisia	Instance Nationale des Télécommunications	2001/2008
United Arab Emirates	Telecommunications Regulatory Authority	2003
Yemen[a]	Ministry of Telecommunications and Information Technology	..

Source: ESCWA.
Note: (..) indicate that data are unavailable.
[a] No independent body has been established to regulate the telecommunications sector; the Ministry undertakes this task.

sector in the Arab region, but differences persist between countries. All Arab countries, excluding Palestine and Yemen, have established ministries and bodies to regulate the telecommunications sector. Jordan was the first Arab country to take effective action in this field in 1995. Kuwait and Qatar established telecommunications regulatory bodies in 2014. Table 2.1 sets out telecommunications regulatory bodies in Arab countries and the year of their establishment, re-establishment or reform. It should be noted that the Libyan General Telecommunications Authority closed its doors when the conflict began in 2011.

In the past, telecommunications regulatory bodies in the Arab region promoted competitiveness in mobile telecommunications and Internet services. Competitiveness gradually expanded to cover fixed telecommunications and its infrastructure in several countries, including Bahrain, Iraq, Jordan, Oman, Morocco, Saudi Arabia and Tunisia. In 2014, the entities that had monopolized the fixed telecommunications sector in the past still dominated in many countries, such as Egypt, Kuwait, Lebanon, Palestine, the Syrian Arab Republic and Yemen. In contrast, the telecommunications sector in Algeria, Libya, Qatar, the Sudan and the United Arab Emirates witnessed a duopoly. By 2014, duopolies in the mobile telecommunications sector remained only in Lebanon, Qatar, the Syrian Arab Republic and the United Arab Emirates; and in the Internet services sector in Oman, Qatar, the United Arab Emirates and Yemen.

Mobile virtual network operators began competing in some countries, including Oman in 2009 and Jordan in 2010. Moreover, in 2010, competitiveness in various tools emerged in the fixed telecommunications sector in several

Table 2.2. Competitiveness in the telecommunications sector in the Arab region, 2014

Country	Fixed telephone services	Mobile telephone services	Internet services[a]
Algeria	Duopoly	Competitive	Competitive
Bahrain	Competitive	Competitive	Competitive
Egypt	Monopoly	Competitive	Competitive
Iraq	Competitive	Competitive	Competitive
Jordan	Duopoly	Competitive	Competitive
Kuwait	Monopoly	Duopoly	Competitive
Lebanon	Duopoly	Competitive	Duopoly
Libya	Competitive	Competitive	Competitive
Morocco	Competitive	Competitive	Duopoly
Oman	Monopoly	Competitive	Competitive
Palestine	Duopoly	Duopoly	Duopoly
Qatar	Monopoly	Competitive	Competitive
Saudi Arabia	Monopoly	Duopoly	Competitive
Sudan	Duopoly	Competitive	Competitive
Syrian Arab Republic	Monopoly	Competitive	Competitive
Tunisia	Competitive	Competitive	Competitive
United Arab Emirates	Competitive	Competitive	Competitive
Yemen	Monopoly	Competitive	Duopoly

Source: Arab Advisors Group, An overview of the telecom market landscape in 18 Arab countries, February 2015.
Note: Theses services are limited to fixed internet services only.

countries, such as local-loop unbundling and colocation services to rapidly eliminate monopolies, which could explain the increase in fixed network operators in Bahrain (nine in 2014) and other Arab countries. In 2013, there were over 20 operators in the region, many of whom had received licences from 2007 to provide fixed wireless access services through various technologies, such as Worldwide Interoperability for Microwave Access (WiMAX) and code division multiple access (CDMA), in Bahrain, Iraq, Jordan, Kuwait, Oman, Saudi Arabia, the Sudan and Yemen, among others.

B. Indicators on service provision

1. Fixed telephone penetration

Table 2.3 shows fixed telephone penetration rates in Arab countries over the period 2003-2014. Before 2003, most Gulf Cooperation Council countries recorded high penetration levels compared with other Arab countries, and to the rest of the world to some extent. However, levels were low in Algeria, Iraq, Morocco, the Sudan and Yemen as a result of monopoly. Countries launched projects to increase the penetration of fixed telephones and bridge the penetration gap between urban and rural areas. Rates began to rise slowly but steadily until they stabilized over the period 2007-2009, owing to either market saturation, a move towards mobile telephones or both. After 2009, a relative drop in rates was recorded in Jordan and the Sudan, primarily because of the move towards mobile phones. In 2014, Gulf Cooperation Council (GCC) countries led in terms of fixed telephone penetration, despite a drop in penetration rates, followed by Lebanon

Table 2.3. Fixed telephone penetration rates in the Arab region (%), 2003-2014

Country	2003	2005	2007	2009	2011	2013	2014	Compound annual growth rate
Morocco	4.12	4.45	7.81	11.24	11.12	8.86	7.42	5.49
Yemen	3.64	4.48	4.82	4.49	4.61	4.68	4.79	2.52
Syrian Arab Republic	13.94	15.98	17.65	18.41	19.67	20.22	18.13	2.42
Palestine	7.11	9.47	9.36	9.41	9.30	9.32	9.09	2.26
Algeria	6.30	7.57	8.74	7.08	8.10	7.98	7.75	1.90
Iraq	4.56	4.07	4.75	5.47	5.63	5.63	5.60	1.89
Lebanon	18.97	15.92	16.85	18.93	19.09	18.04	19.45	0.23
Oman	9.89	10.52	11.48	11.27	9.50	9.67	9.56	-0.31
Bahrain	24.06	22.00	19.72	19.97	21.39	21.88	21.18	-1.15
Saudi Arabia	15.33	15.57	15.42	15.57	16.69	16.97	13.36	-1.25
Libya	13.83	15.23	16.76	17.83	16.38	12.72	11.30	-1.82
Tunisia	11.82	12.51	12.39	12.16	11.32	9.29	8.54	-2.91
United Arab Emirates	33.71	29.81	23.90	20.47	20.45	22.32	22.26	-3.70
Qatar	27.95	25.01	20.60	18.41	16.17	19.02	18.41	-3.72
Kuwait	23.01	21.98	21.07	18.54	16.47	15.08	14.20	-4.29
Egypt	12.58	14.48	15.13	13.43	10.98	8.31	7.57	-4.51
Sudan	2.56	1.48	0.85	0.87	1.33	1.09	1.08	-7.56
Jordan	12.49	11.99	9.88	8.11	6.91	5.20	5.00	-7.98

Source: ESCWA, based on ITU ICT Indicators Database, 2015.
Note: Compound annual growth rate for the period 2003-2014.

and the Syrian Arab Republic. However, penetration rates remained low in Iraq, the Sudan and Yemen as a result of fixed networks falling into disrepair because of unstable security situations.

Morocco, the Syrian Arab Republic and Yemen recorded the highest compound annual growth rates over the period 2003-2014. Nevertheless, penetration rates remained relatively low in Morocco and Yemen over the same period and over half of Arab countries registered negative rates, including GCC countries. Egypt, the Sudan and especially Jordan witnessed a relatively sharp drop in rates.

2. Mobile telephone penetration

Table 2.4 shows the penetration rates of mobile telephones in Arab countries over the period 2013-2014. Since 2002, the number of mobile telecommunication users has exceeded that of fixed telecommunication users in most Arab countries. Since 2003, GCC countries have recorded high penetration levels compared with regional and global rates, whereas levels have remained low in Algeria, Iraq, Libya, the Syrian Arab Republic, the Sudan and Yemen. Mobile services have grown rapidly since 2005 in line with developments in and the spread of 3G mobile services. Over the period 2007-2011, penetration rates exceeded 100 per cent in most Arab countries. In 2014, GCC countries remained at the forefront of Arab countries in mobile telephone penetration rates, followed by Libya and Jordan. Positive compound annual growth rates were recorded in all Arab countries for the period 2003-2014. They were especially high in Iraq following a deterioration in services caused by conflict

Table 2.4. Mobile phone penetration rates in the Arab region (%), 2003-2014

Country	2003	2005	2007	2009	2011	2013	2014	Compound annual growth rate
Iraq	0.31	5.60	48.79	66.69	80.16	96.10	94.91	68.27
Libya	2.34	35.75	77.83	159.85	163.85	165.04	161.12	46.92
Sudan	1.44	4.76	20.36	36.11	68.78	72.85	72.20	42.75
Algeria	4.38	40.23	78.53	89.96	94.31	100.79	93.31	32.06
Yemen	3.54	11.31	20.53	37.40	50.07	69.01	70.06	31.18
Egypt	8.35	18.99	40.54	72.10	105.08	121.51	114.31	26.86
Syrian Arab Republic	6.85	16.24	31.87	47.65	59.24	56.13	70.95	23.68
Palestine	7.71	15.94	27.42	45.99	70.12	73.74	72.08	22.53
Tunisia	19.47	56.52	76.34	93.21	115.20	115.60	128.49	18.71
Oman	24.86	52.86	97.29	149.09	159.00	154.65	157.75	18.29
Saudi Arabia	31.67	57.37	109.59	167.43	194.51	184.20	179.56	17.09
Jordan	26.59	59.89	84.37	97.30	111.16	141.80	147.90	16.88
Morocco	24.88	41.14	65.31	80.93	114.02	128.53	131.71	16.36
Lebanon	21.56	24.92	30.44	56.28	77.19	80.56	88.35	13.68
Kuwait	67.10	60.19	55.83	91.87	157.91	190.29	218.43	11.33
Bahrain	57.39	87.22	108.10	117.66	131.01	165.91	173.27	10.57
Qatar	57.03	87.29	109.70	124.60	120.48	152.64	145.76	8.91
United Arab Emirates	88.22	109.29	133.36	138.27	131.40	171.87	178.06	6.59

Source: ESCWA, based on ITU ICT Indicators Database, 2015.

and mismanagement, and relatively high in Algeria, Libya, the Sudan and Yemen.

3. Internet penetration

The price of personal computers began to fall from 2003, significantly affecting Internet service penetration and prices. GCC countries recorded the highest Internet penetration levels in the region. Some countries, including Jordan, Lebanon, the Syrian Arab Republic and Yemen, launched community access initiatives that entailed the establishment of access points and kiosks in rural areas to facilitate Internet access. Other countries, including Egypt, implemented projects to equip all households with a computer at an affordable price, and policies to exempt computers from custom duties. Before the spread of broadband Internet services, Egypt launched an initiative for free dial-up Internet services. The Syrian Arab Republic and Yemen, among other countries, attempted to do the same with varying success. Weak awareness of the importance of the Internet and it applications in business, education and other sectors, in addition to a lack of Arabic content and difficulties faced by users in working in other languages, contributed to weak penetration when Internet services were first launched. Following the recent popularity of smart phones and social networks, and a drop in the use of dial-up services with the spread of fixed and mobile broadband and wireless local area networks (WLAN), usage patterns and penetration levels have changed considerably, especially because countries began focusing on increasing broadband penetration levels.

Table 2.5. Internet penetration rates in Arab countries (%), 2003-2014

Country	2003	2005	2007	2009	2011	2013	2014	Compound annual growth rate
Sudan	0.54	1.29	8.66	..	17.30	22.7	24.6	41.56
Yemen	0.60	1.05	5.01	9.96	14.91	20.0	22.6	38.95
Iraq	0.60	0.90	0.93	1.06	5.00	9.2	11.3	30.59
Morocco	3.35	15.08	21.50	41.30	46.11	56.0	56.8	29.33
Palestine	4.13	16.01	21.18	32.23	41.08	46.6	53.7	26.25
Oman	7.26	6.68	16.68	26.80	48.00	66.5	70.2	22.92
Lebanon	8.00	10.14	18.74	30.14	52.00	70.5	74.7	22.52
Syrian Arab Republic	3.40	5.65	11.50	17.30	22.50	26.2	28.1	21.17
Algeria	2.20	5.84	9.45	11.23	14.00	16.5	18.1	21.13
Saudi Arabia	8.00	12.71	30.00	38.00	47.50	60.5	63.7	20.76
Egypt	4.04	12.75	16.03	20.00	25.60	29.4	31.7	20.60
Tunisia	6.49	9.66	17.10	34.07	39.10	43.8	46.2	19.52
Libya	2.81	3.92	4.72	10.80	14.00	16.5	17.8	18.23
Jordan	8.47	12.93	20.00	26.00	34.90	41.0	44.0	16.16
Qatar	19.24	24.73	37.00	53.10	69.00	85.3	91.5	15.23
Bahrain	21.55	21.30	32.91	53.00	77.00	90.0	91.0	13.99
Kuwait	22.40	25.93	34.80	50.80	65.77	75.5	78.7	12.10
United Arab Emirates	29.48	40.00	61.00	64.00	78.00	88.0	90.4	10.72

Source: ESCWA, based on ITU ICT Indicators Database, 2015.

Table 2.5 shows Internet penetration levels in Arab countries for the period 2003-2014. It indicates that Bahrain, Kuwait, Qatar and the United Arab Emirates have recorded, since 2003, high penetration rates at the regional and global levels. However, penetration remained low in Iraq, the Syrian Aran Republic and Yemen, among others. By 2008, penetration levels had begun to rise following a considerable increase in service providers, although these numbers varied between countries. GCC countries were at the forefront of other Arab countries in 2014, although Saudi Arabia lagged slightly behind, followed by Lebanon, Morocco and Palestine. Compound annual growth rates for the period 2003-2014 were positive in all countries, and especially high in the Sudan and Yemen.

Broadband internet penetration rates remained very low in most Arab countries until 2005, when they began to increase in GCC countries and Lebanon. Growth in fixed broadband services slowed in some countries, such as Tunisia, because of a move towards wireless and mobile broadband connections and the spread of third and fourth generation mobile services. Table 2.6 shows fixed broadband penetration levels in the Arab region over the period 2003-2014, and indicates that penetration rates in all Arab countries, excluding Bahrain, Lebanon, Saudi Arabia and the United Arab Emirates, remained below 10 per cent in 2014. Compound annual growth rates for the period 2003-2014 were positive in all countries, and significantly high in Morocco, Oman, the Syrian Arab Republic,

Table 2.6. Fixed broadband penetration rates in the Arab region (%), 2003-2014

Country	2003	2005	2007	2009	2011	2013	2014	Compound annual growth rate
Syrian Arab Republic	0.00	0.01	0.04	0.16	0.56	1.58	1.68	76.71
Oman	0.01	0.83	1.56	1.52	1.84	2.53	2.90	76.29
Yemen	0.01	0.52	0.79	1.54	2.59	4.25	4.51	74.30
Tunisia	0.00	0.01	0.05	0.24	0.47	1.05	1.39	73.03
Algeria	0.00	0.17	0.93	3.55	5.20	4.86	4.44	64.83
Saudi Arabia	0.05	0.40	0.82	2.25	2.60	3.26	4.01	48.97
Palestine	0.20	0.27	2.40	5.37	6.93	10.18	10.36	48.40
Jordan	0.00	0.21	1.49	..	3.79	4.92	5.30	43.15
Egypt	0.10	0.45	1.57	3.85	4.41	4.51	4.66	41.80
Qatar	0.08	0.20	0.64	1.36	2.32	3.26	3.68	41.63
Bahrain	0.45	3.12	7.55	9.04	8.53	9.94	9.90	32.45
United Arab Emirates	1.26	2.44	6.46	11.71	22.55	22.52	21.39	29.36
Lebanon	0.90	3.12	6.55	8.91	9.71	11.11	11.51	26.07
Sudan	1.90	3.26	4.64	4.64	8.28	9.95	22.80	25.35
Qatar	0.00	0.00	0.11		0.05	0.07	0.05	22.28
Kuwait	0.61	1.09	1.37	1.58	1.50	1.40	1.38	7.70
Libya	0.00	..	..	1.06	1.15	1.04	1.00	4.01
Iraq	..	..	0.00	0.00	..	..	..	..

Source: ESCWA, based on ITU ICT Indicators Database, 2015.
Note: (..) indicate that data are unavailable.

Tunisia and Yemen, noting that increases in growth rates do not necessarily translate into higher penetration rates. Mobile broadband penetration rates (table 2.7) were much higher in 2014 than fixed broadband penetration rates, with significant variations between GCC countries and other Arab countries. Broadband penetration rates are expected to rise with the spread of 4G mobile services.

By 2013, fourth generation mobile services, also known as long-term evolution, had become widespread in many Arab countries, including Kuwait, Oman, Qatar and the United Arab Emirates. There are several plans to launch these services commercially or on a trial basis in other Arab countries, which will potentially increase Internet connection speeds and mobile broadband penetration rates.

C. Internet infrastructure

1. Internet backbone and international bandwidth

By 2003, several Arab countries had developed plans to build national backbone networks for Internet services and data exchange. The plans aimed to provide optimal Internet access in all areas of a country, to ensure that existing infrastructure could handle the significant increase in Internet application usage and to provide the necessary international bandwidth. Table 2.8 shows increases in international bandwidth for each Internet user.

It should be noted that the regional Internet backbone network, which was being discussed before 2003, has not yet been implemented despite the considerable benefits it is expected to provide in

Table 2.7. Mobile broadband penetration rates in the Arab region (%), 2009-2014

Country	2009	2011	2013	2014	Compound annual growth rate
Yemen	..	0.09	3.28	4.79	276.10
Jordan	..	4.64	16.14	19.06	270.90
Oman	15.97	35.58	67.26	73.69	244.03
Tunisia	..	9.49	30.89	47.56	171.72
Bahrain	1.58	9.78	109.97	126.19	119.48
Qatar	11.84	56.73	76.79	106.31	98.18
Syrian Arab Republic	0.19	0.92	2.98	5.68	97.24
United Arab Emirates	..	19.20	89.04	113.96	81.05
Lebanon	..	9.59	41.82	53.51	77.36
Morocco	2.26	8.08	14.96	26.82	77.21
Sudan	..	19.00	25.50	27.24	72.44
Saudi Arabia	..	40.84	85.09	99.03	40.14
Egypt	11.70	25.00	35.08	43.50	30.04
Libya	..	..	64.50	80.56	24.90
Kuwait	..	..	137.17	139.80	24.54
Palestine	..	0.58	0.74	..	12.60
Algeria	..	..	..	20.79	..
Iraq	..	..	..	3.6	..

Source: ESCWA, based on ITU ICT Indicators Database, 2015.
Note: (..) indicate that data are unavailable.

strengthening connectivity between Arab countries and in controlling communication traffic within the region without the need for it to leave and re-enter, which could significantly affect Internet prices and joint services and applications in the fields of e-commerce and e-business, for example.

2. Fibre to the home

In addition to Internet backbone networks, which have fibre optics at their heart, a fibre to the home (FTTH) technology has been developed that takes fibre optics into users' homes. It provides users with a large bandwidth (over 60 MB/s), sufficient to operate new Internet protocol services such as Triple Play, Internet protocol television (IPTV), VoIP, video on demand and interactive games, among others. Investment in these technologies in the Arab region is currently dependent on their establishment, which is progressing slowly – FTTH projects were being implemented in 11 of 18 Arab countries in 2013. The number of service providers varies between countries: Algeria, Iraq and Qatar have one service provider, Tunisia has five and Bahrain has seven, for example.

3. Submarine cables

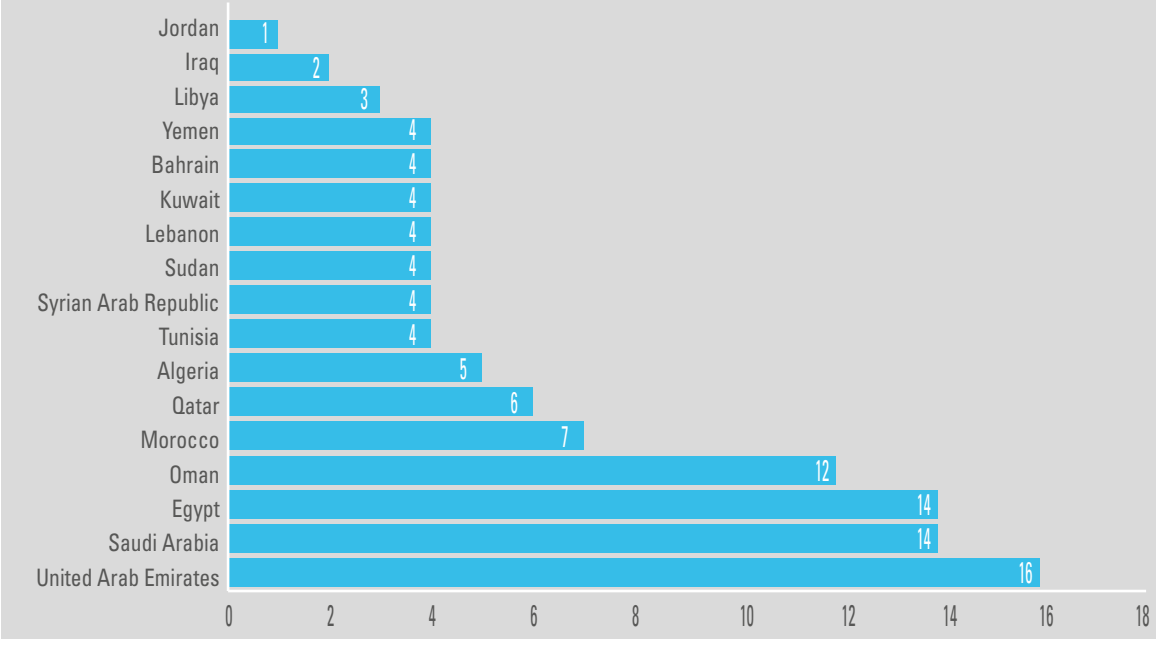
Regional and subregional submarine cable systems have existed in the Arab region since 2003. At first, they were used for traditional voice communications and have now become carriers of Internet traffic and data exchange. By June 2014, 50 submarine cables had been connected in the Arab region,[1] 41 of which are currently in service and are connected to landing points, and two of which will have landing points in Arab countries in the near future. The remaining seven cables are expected to be laid soon.[2]

Table 2.8. Increases in international bandwidth per Internet user in the Arab region (bit/s), 2003-2014

Country	2003	2005	2007	2009	2011	2013	2014
Algeria	216	79	..	4,895	12,977	10,820	12,460
Bahrain	2,458	2,183	5,637	11,704	15,069	25,856	49,054
Egypt	330	413	1,117	4,159	6,015	7,777	9,302
Iraq	..	130	120	250	63	..	..
Jordan	735	457	827	6,707	5,960	4,359	7,874
Kuwait	605	1,481	2,608	48,347	38,928	44,818	50,096
Lebanon	203	717	1,199	1,422	5,368	15,444	23,992
Libya	39	456	1,135	14,345	12,874	12,705	12,606
Morocco	312	1,562	3,811	3,964	6,427	8,418	10,768
Oman	1,984	2,960	2,916	2,406	9,092	19,460	33,724
Palestine	283	421	1,521	..	10,906	10,912	14,700
Qatar	3,660	3,816	9,815	19,969	27,303	48,598	67,473
Saudi Arabia	213	383	1,585	5,303	9,858	21,776	30,548
Sudan	456	407	..	..	2,110	2,321	2,499
Syrian Arab Republic	27	333	469	980	3,322	3,312	4,048
Tunisia	243	773	1,807	7,863	14,613	19,134	25,972
United Arab Emirates	1,717	3,082	5,572	12,319	21,906	36,476	44,503
Yemen	52	28	443	677	2,015	2,458	2,220

Source: ESCWA, based on ITU ICT Indicators Database, 2015.
Note: (..) indicate that data are unavailable.

Figure 2.1. Number of submarine cable systems connected to Arab countries, 2014 (existing and planned cables)



Source: Arab Advisors Group, 2014.

Some cable systems in figure 2.1 connect a specific Arab country to the rest of the world without connecting it to other countries in the region. Several Arab countries, including Bahrain, Kuwait, Qatar and the United Arab Emirates, have laid cables between them as a precautionary measure to secure additional or alternative routes for existing cables and ensure secure and stable Internet connectivity, especially after several cables were damaged at the start of the decade.

Although submarine cables can provide countries with larger bandwidth for international Internet connectivity and provide direct access to the Internet at the global level, laying such cables is not the optimal strategic solution for the Arab region. To improve Internet access and reduce its costs, Arab countries must first adopt a new Internet structure that connects Arab countries to each other via direct cables so as to ensure appropriate internal access between them. Once this is achieved, Internet exchange points can then secure access to the global Internet network.

4. Internet exchange points

Internet exchange points (IXP), formerly known as personal area networks (PAN), are physical data structures that allow several Internet providers to link their networks to direct data exchange in the most optimal manner and to limit exchanges on costly paths, so as to reduce costs and facilitate tackling malfunctions. IXP are key elements of today's network infrastructure. Specialized bodies in the Arab region, including regional and international organizations, have made concerted efforts to promote the establishment of IXP. Table 2.9 lists IXP in the Arab region, the first of which was established in Egypt in 2002 and the most recent in Palestine in 2012. Given that networking within the region depends on international connectivity, future efforts should focus on developing Internet infrastructure

Table 2.9. IXP in the Arab region, June 2015

Country	IXP	Abbreviation	Establishment	Internet site
Bahrain	Bahrain Internet Exchange	BIX	2003	www.bix.bh
	Gateway Gulf Internet Exchange	GulfIX	2009	www.gatewaygulf.bh
Egypt	Cairo Internet Exchange	CAIX	2002	www.caix.net.eg
	Middle East Internet Exchange	MEIX	2007	www.gpxglobal.net/internet-data-centers/cairo-1/
Lebanon	Beirut Internet Exchange	BIX	2007	www.beirutix.net
Palestine	Palestine Internet Exchange	PIX	2012	www.facebook.com/palestineix
Saudi Arabia	Internet Exchange Point of Saudi Arabia	IXSA	2009	www.ix.net.sa
Sudan	Sudan Internet Exchange Point	SIXP	2010	www.sixp.sd
Tunisia	Tunisia Internet Exchange Point	TunIXP	2011	www.ati.tn/TunIXP
United Arab Emirates	United Arab Emirates Internet Exchange	UAE-IX	2012	www.uae-ix.net
	Emirates Internet Exchange	EMIX	1998	www.emix.ae

Source: ESCWA, based on https://prefix.pch.net.

in the region by linking national IXP so as to establish regional IXP.

D. Maturity levels of ICT infrastructure in selected Arab countries

Arab countries can be divided in the following four categories, according to ICT infrastructure maturity levels (table 2.10).

Maturity level 1: countries with low ICT penetration rates, weak Internet infrastructure and services, weak international connectivity to the Internet backbone network, and a shortage of Internet service providers.

Maturity level 2: countries with satisfactory ICT penetration levels, improved Internet penetration with good broadband services, growing international connectivity to the Internet backbone network, and active Internet companies.

Maturity level 3: countries with high ICT penetration levels, relatively good Internet infrastructure, widespread broadband services, solid international connectivity to the Internet backbone network, and active Internet companies.

Maturity level 4: countries with ICT penetration levels on a par with global levels, very strong Internet infrastructure, highly widespread broadband services, highly developed international connectivity to the Internet backbone network, and internationally-recognized Internet companies.

Table 2.10. ICT infrastructure maturity levels in selected Arab countries

Country	2003	2005	2007	2009	2011	2013	2015
Bahrain	3	4	4	4	4	4	4
Egypt	2	2	2	2	2	2	2
Iraq	1	1	1	1	1	1	1
Jordan	2	2	3	3	3	3	3
Kuwait	2	3	3	3	3	3	4
Lebanon	2	2	2	2	2	3	3
Libya	-	-	-	-	-	1	2
Morocco	-	-	-	-	-	2	2
Oman	2	2	2	2	3	3	3
Palestine	1	2	2	2	2	2	2
Qatar	3	3	3	4	4	4	4
Saudi Arabia	2	3	3	3	3	4	4
Sudan	-	-	-	1	1	1	1
Syrian Arab Republic	2	2	2	2	2	1	1
Tunisia	-	-	-	-	-	2	3
United Arab Emirates	4	4	4	4	4	4	4
Yemen	1	1	1	1	1	1	1
Regional average	2.1	2.4	2.5	2.4	2.5	2.4	2.6

Source: ESCWA.
Note: Data do not cover Libya, Morocco and Tunisia before 2013, given that they joined ESCWA in 2012.

E. Comparative performance of the Arab region

Most Arab countries have attempted to improve their ICT infrastructure and to encourage competitiveness in the telecommunications sector. A significant positive correlation exists between the liberalization of telecommunications services and increases in access to ICT and mobile phone and Internet penetration levels.

1. Fixed telephone penetration rates

In 2015, the average fixed telephone penetration rate in Arab countries did not exceed 8 per cent, which is lower than the global average of 14.5 per cent and the average in most developing countries (figure 2.2).

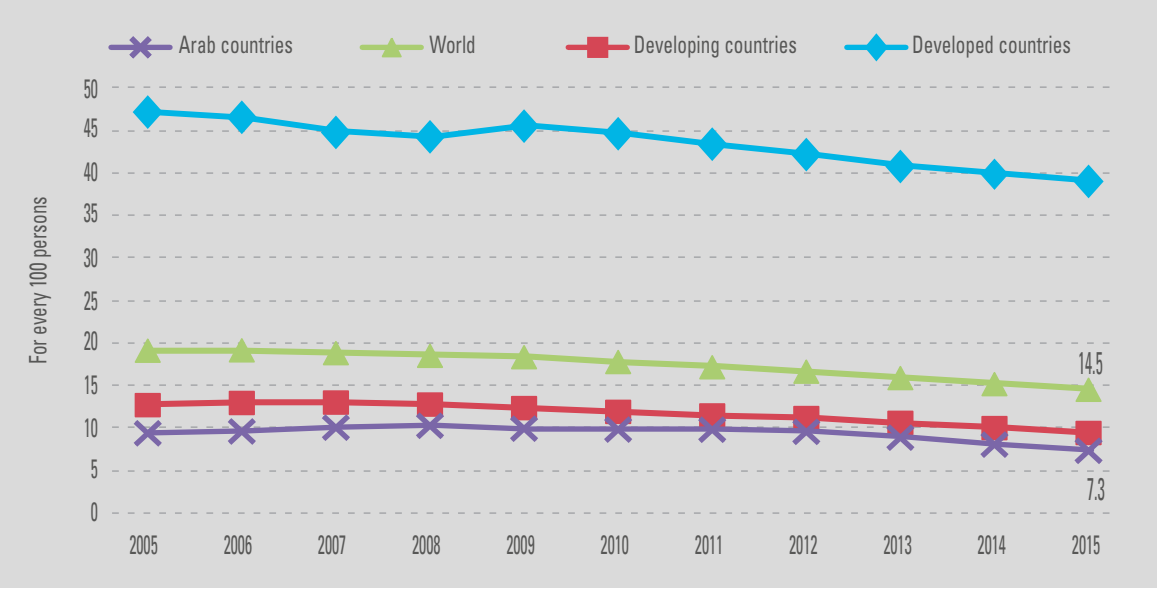
2. Mobile telephone penetration rates

In 2015, the average mobile telephone penetration rate reached 108.2 per cent in Arab countries, which is higher than the global average of 96.8 per cent (figure 2.3). The compound annual growth rate of mobile telephone penetration in the Arab region was 55 per cent over the period 2005-2015.

3. Internet penetration rates

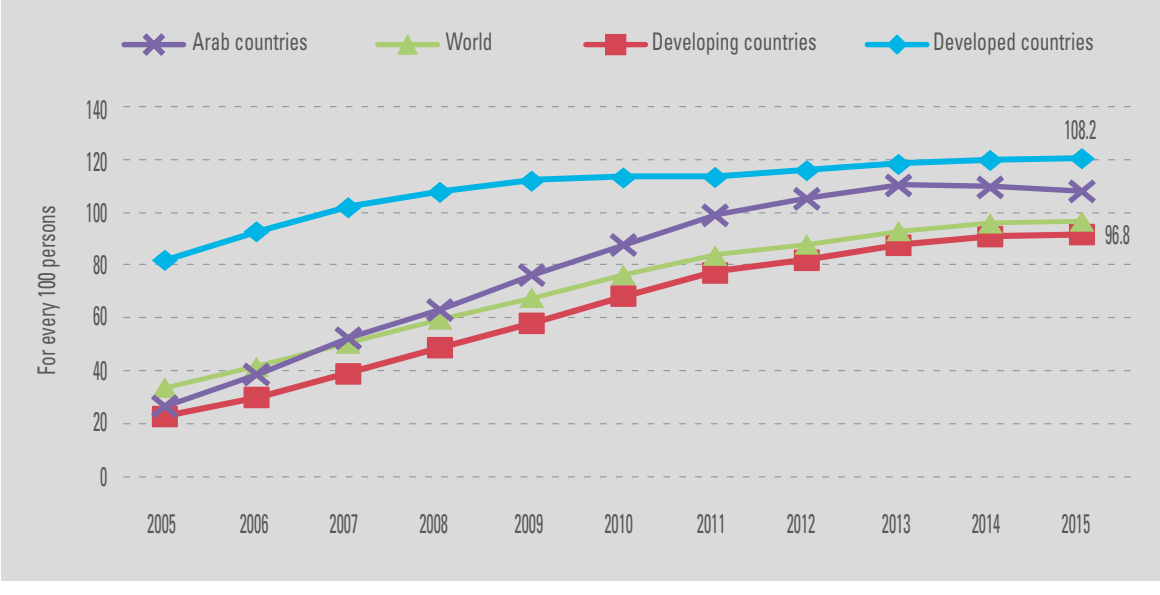
In 2015, the average Internet penetration rate was 37 per cent in the Arab region, which is slightly lower than the global average of 43.4

Figure 2.2. Fixed telephone penetration rates across the world, 2005-2015



Source: ESCWA, based on ITU ICT Indicators Database, 2015.

Figure 2.3. Mobile telephone penetration rates across the world, 2005-2015



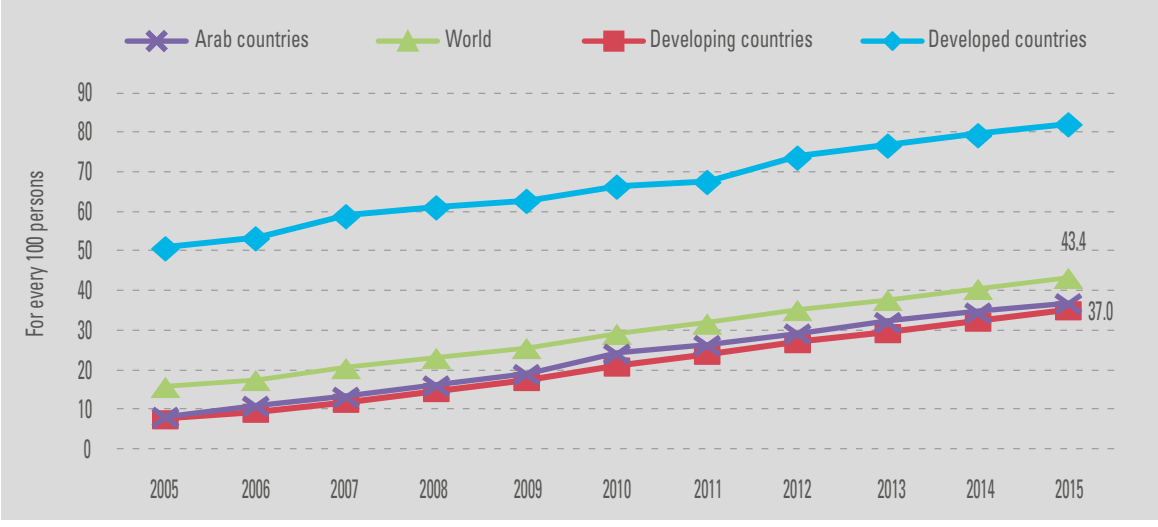
Source: ESCWA based on ITU ICT Indicators Database, 2015.

per cent (figure 2.4). The compound annual growth rate of Internet penetration in the Arab region was 40 per cent over the period 2005-2015.

4. Fixed broadband penetration rates

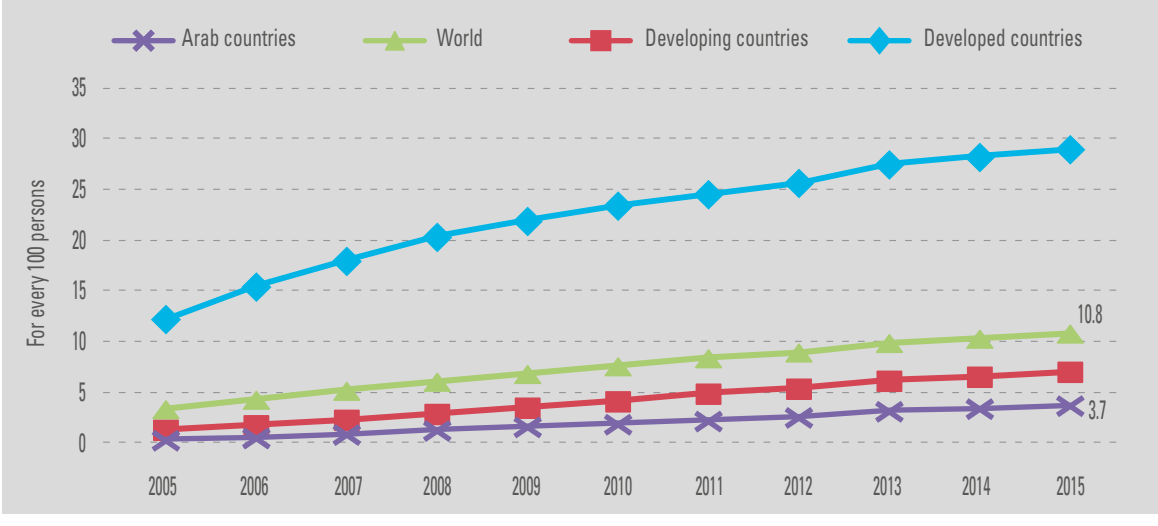
In 2015, the average fixed broadband penetration rate was only 3.7 per cent in the Arab region,

Figure 2.4. Internet penetration rates across the world, 2005-2015



Source: ESCWA, based on ITU ICT Indicators Database, 2015.

Figure 2.5. Fixed broadband penetration rates across the world, 2005-2015



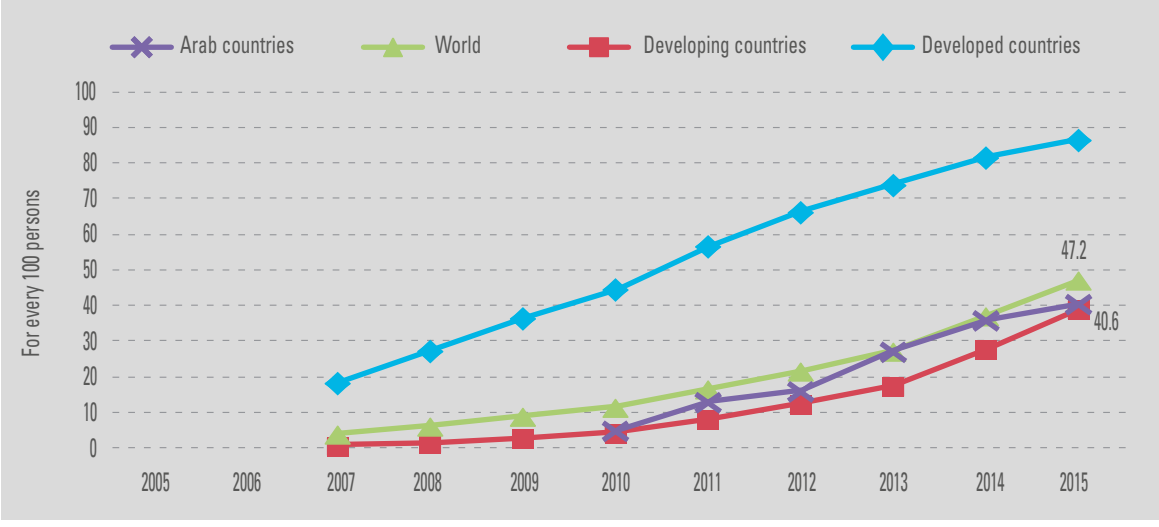
Source: ESCWA, based on ITU ICT Indicators Database, 2015.

which is lower than the global rate of 10.8 per cent (figure 2.5), as a result of high prices and low fixed telephone penetration rates.

5. Mobile broadband penetration rates

In 2015, the average mobile broadband penetration rate was 40.6 per cent in the Arab region, which is lower than the global rate of 47.2 per cent, because of several factors including high prices (figure 2.6). Mobile broadband penetration rates were over 10 times higher than fixed broadband penetration rates in 2015, because mobile services are seen as a convenient alternative to fixed services given the weak presence of the latter.

Figure 2.6. Mobile broadband penetration rates across the world, 2007-2015



Source: ESCWA, based on ITU ICT Indicators Database, 2015.

F. Conclusion

ICT infrastructure in the Arab region has many strengths and weaknesses.

1. Strengths

- Satisfactory mobile broadband and mobile telephone penetration rates
- Relatively good Internet infrastructure and solid international connectivity.

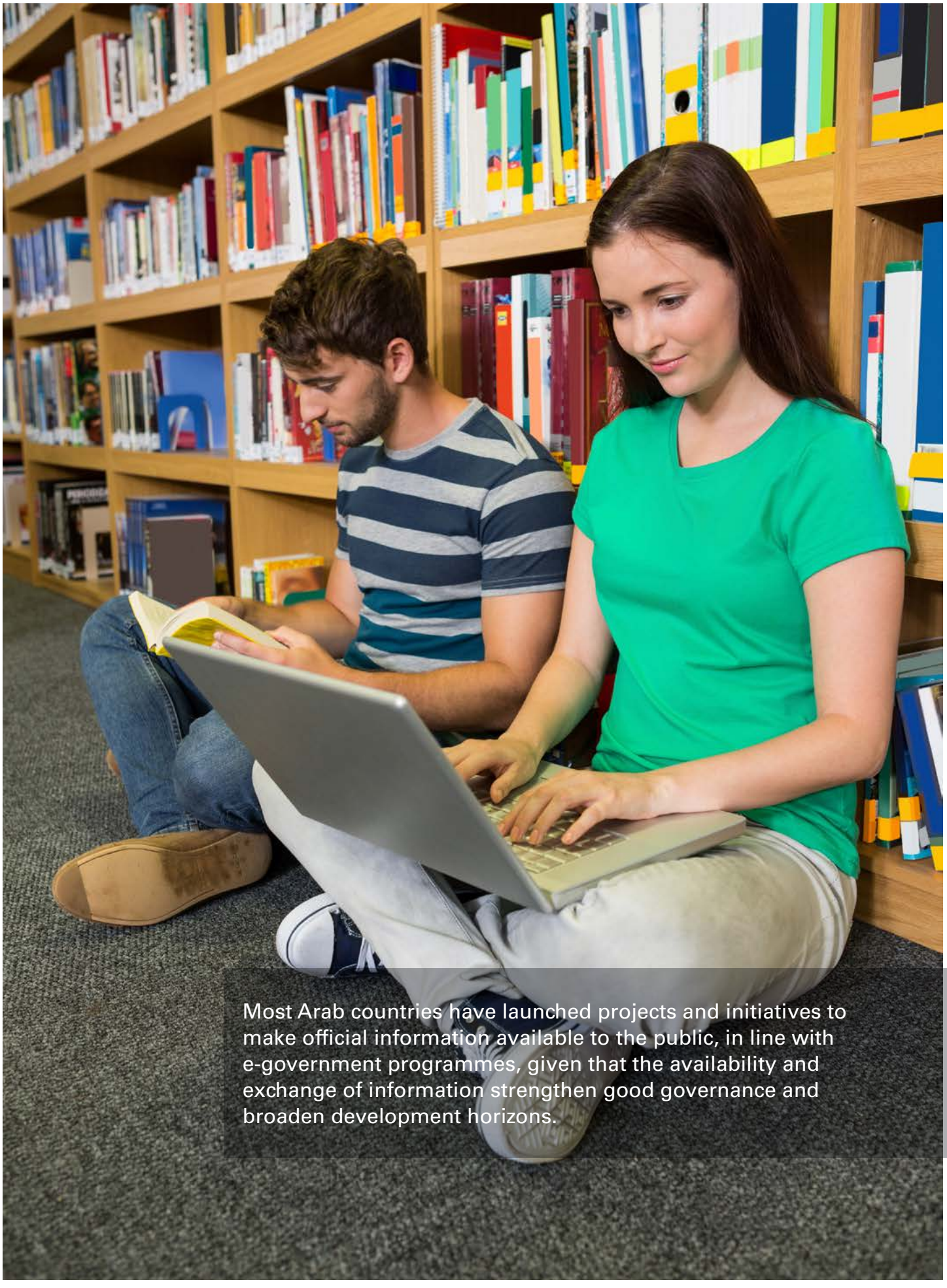
2. Weaknesses

- Low fixed telephone penetration rates compared with global levels
- Limited fixed broadband Internet services because of weak fixed telephone penetration
- General inefficiency of entities responsible for telecommunications regulation.

3. Recommendations

- Continue to establish independent, specialized and transparent entities to regulate the telecommunications sector in ESCWA member States, and develop licensing plans and build organizational structures to meet new technology requirements in the telecommunications field, especially for wireless and mobile broadband services
- Expedite the liberalization of the telecommunications sector, and promote competitiveness in its subsectors given the significant impact of competitiveness on strengthening service provision in all areas at affordable prices
- Focus on projects to strengthen fixed and mobile broadband services, including improving their quality and affordability, by adopting a comprehensive approach based on the recommendations of the Broadband Commission for Digital Development[3]
- Provide regulatory incentives to develop telecommunications services in remote areas
- Work within the regional framework to benefit from economies of scale with regard to connectivity and from sharing broadband services, a regional telecommunications backbone network and regional manufacturing capacities

- Promote the establishment of national and regional Internet exchange points (IXP) by simplifying conditions for their establishment, laying fibre optic cables for subregional connectivity at affordable prices, and benefiting from national and global experiences in the field
- Create an environment that supports and attracts investments in ICT infrastructure through appropriate political and legislative regulation
- Continue to develop the ICT sector to ensure competitiveness in the provision of services that are affordable to all social groups.



Most Arab countries have launched projects and initiatives to make official information available to the public, in line with e-government programmes, given that the availability and exchange of information strengthen good governance and broaden development horizons.

3. Access to information and knowledge

In order for ICT infrastructure, tools and services to be an effective method for accessing information and for generating and disseminating knowledge, all persons must be able to access information and digital content freely and affordably.

A. Network readiness and its impact on basic services

Despite regulations imposed on accessing some information types in several Arab countries, such as site blocking and prohibiting VoIP, these countries have maintained efforts to improve access to information in general. There are clear variations within and between countries in terms of information availability and access, as a result of limited Internet penetration, especially broadband services; unaffordable access costs; lack of access initiatives, especially in rural and remote areas; weak digital Arabic content (DAC); and limited e-services, especially government services.

The Networked Readiness Index, developed by the World Economic Forum, measures the readiness of countries to benefit from ICT opportunities that increase their

Table 3.1. Networked Readiness Index in the Arab region, 2007-2015

Country	2007-2008		2009-2010		2012		2014		2015	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	4.6	29	4.9	23	4.8	30	5.2	24	5.3	23
Qatar	4.4	32	4.5	30	4.8	28	5.2	23	5.1	27
Bahrain	4.1	45	4.6	29	4.9	27	4.9	29	4.9	30
Saudi Arabia	4.1	48	4.3	38	4.6	34	4.8	32	4.7	35
Oman	4.0	53	3.9	50	4.4	40	4.6	40	4.6	42
Jordan	4.1	47	4.1	44	4.2	47	4.4	44	4.3	52
Kuwait	4.0	52	3.6	76	3.9	62	4.0	72	4.0	72
Morocco	3.7	74	3.4	88	3.9	91	3.6	99	3.9	78
Tunisia	4.3	35	4.2	39	4.1	50	3.8	87	3.9	81
Egypt	3.7	63	3.7	70	3.8	79	3.7	91	3.6	94
Lebanon	..	..	..	..	3.5	95	3.6	97	3.5	99
Algeria	3.4	88	3.1	113	3.0	118	3.0	129	3.1	120
Libya	3.1	105	3.2	103	..	..	2.8	138	2.9	131
Syrian Arab Republic	3.1	110	3.1	105	2.9	129	..	..	..	..
Yemen	..	..	..	..	2.4	141	2.7	140	2.7	136
Regional average	3.89		3.89		3.94		4.02		4.04	

Source: World Economic Forum, Global Information Technology Reports, from 2007 to 2015.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.
Note: "Value" indicates the sum of Index points by country, ranging from 1 to 7.

competitiveness.[1] Table 3.1 shows the total Index values of Arab countries for the period 2007-2015, and highlights that GCC countries, Jordan and Tunisia have ranked highest in the region in recent years and that Bahrain, Qatar and the United Arab Emirates are among the top 30 countries globally.

The Index includes a sub-index on ICT impact at the economic and social levels. Its social pillar comprises an individual indicator that measures the effects of ICT on access to basic services. Table 3.2 gives the values of this indicator in several Arab countries for the period 2010-2015, which can be compared with the Index values in table 3.1. According to table 3.2, GCC countries were at the forefront in 2014 and 2015, and Qatar ranked first globally in 2013 and 2014. If a country scores lower in the individual indicator than in the Index, this shows shortfalls in the use of ICT to improve access, as was the case in Lebanon and Libya in 2015.

Table 3.3 and 3.4 set out values of the two sub-indexes measuring readiness and usage under the Index. Comparing these two elements highlights restrictions faced by key stakeholders, including individuals, businesses and government bodies, in accessing information and knowledge. The readiness sub-index reveals a country's preparedness and will to employ ICT in daily activities. The usage sub-index shows ICT use by key stakeholders in a country. The two above-mentioned tables indicate that GCC countries ranked high among Arab countries over the periods under consideration; small population size and high gross domestic product (GDP) assisted in placing them in pole position overall. However, the sub-indexes also show variations between

Table 3.2. ICT impact on access to basic services in selected Arab countries, 2010-2015

Country	2010-2011		2012		2013		2014		2015	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	6.0	5	5.8	12	5.9	6	6.1	2	6.1	1
Qatar	6.1	3	6.2	2	6.1	1	6.1	1	6.0	2
Bahrain	5.6	11	5.8	13	5.8	13	5.4	18	5.3	21
Saudi Arabia	5.4	20	5.5	23	5.6	16	5.5	16	5.3	25
Jordan	5.0	38	4.6	58	4.7	48	4.9	39	4.9	35
Oman	5.5	17	5.5	24	5.1	31	5.1	34	4.9	37
Tunisia	5.6	13	5.2	35	..	..	4.1	76	4.0	79
Morocco	4.1	94	4.1	95	3.9	92	3.6	106	3.8	89
Kuwait	3.9	110	4.1	90	4.0	84	4.0	78	3.8	93
Egypt	4.9	41	4.2	85	3.8	104	3.8	92	3.8	94
Algeria	3.5	124	3.1	133	2.6	142	3.0	138	3.2	125
Syrian Arab Republic	3.5	126	3.4	128	..	..	..	..	..	..
Yemen	..	..	2.1	142	2.5	143	2.8	142	2.9	136
Lebanon	3.2	128	3.1	136	2.7	141	2.7	145	2.8	139
Libya	3.9	109	..	..	3.2	130	2.7	147	1.9	143
Regional average	4.73		4.48		4.30		4.27		4.19	
Global Average	4.48		4.5		4.3		4.2		4.2	

Source: World Economic Forum, Global Information Technology Reports, from 2007 to 2015.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.
Note: Points awarded to a country are from a total of seven. 1 indicates no accessibility to digital content, and 7 shows accessibility to digital content through a wide range of programmes.

Table 3.3. Readiness sub-index for the Arab region, 2006-2015

Country	2006-2007		2008-2009		2010-2011		2012		2014		2015	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
Bahrain	4.3	59	4.9	38	4.9	30	5.5	25	5.5	32	5.3	40
United Arab Emirates	5.0	27	5.4	25	5.4	6	5.3	36	5.4	38	5.1	54
Qatar	4.8	36	5.4	26	5.5	4	4.9	59	5.5	36	5	56
Oman	..	..	4.9	42	4.8	34	4.7	70	5.1	57	4.9	62
Kuwait	4.2	62	4.5	66	4.0	95	5.1	48	5.0	64	4.8	66
Tunisia	4.9	29	5.2	29	5.1	18	4.8	68	4.6	87	4.8	69
Saudi Arabia	..	..	4.9	41	4.9	24	5.1	46	5.1	54	4.7	75
Jordan	4.2	64	4.8	45	4.4	52	5.1	47	5.2	48	4.6	81
Morocco	3.8	81	4.1	89	3.8	106	4.0	100	4.3	95	4.5	87
Egypt	3.8	82	4.3	85	4.1	74	4.5	79	4.4	93	4.3	90
Libya	..	..	4.0	95	3.5	130	..	..	3.2	122	4.2	94
Bahrain	4.0	73	3.9	100	4.0	86	4.3	88	4.1	101	4.2	97
Lebanon	..	..	..	..	4.0	85	4.3	89	4.6	79	4.1	98
Yemen	..	..	..	..	..	..	2.7	136	3.3	120	3.1	120
Syrian Arab Republic	..	..	4.3	82	3.7	117	2.9	133	..	..	..	..
Regional average	4.3		4.7		4.4		4.5		4.7		4.5	

Source: WEF, Global Information Technology Reports, from 2007 and 2015.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.
Note: "Value" indicates the sum of Index points by country, ranging from 1 to 7.

Table 3.4. Usage sub-index for the Arab region, 2006-2015

Country	2006-2007		2008-2009		2010- 2011		2012		2014		2015	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	5.3	9	4.6	25	4.27	30	4.52	30	5.24	21	5.6	13
Qatar	4.2	36	4.3	31	4.16	34	4.79	25	5.33	18	5.4	17
Bahrain	4.1	39	4.1	35	4.45	27	4.77	26	5.13	25	5.2	25
Saudi Arabia	..	..	3.9	44	3.88	39	4.33	33	4.78	31	4.9	29
Oman	..	..	3.5	55	3.76	43	4.12	40	4.4	37	4.6	35
Jordan	3.5	59	3.8	45	3.57	53	3.77	55	3.96	59	4.1	51
Kuwait	3.5	60	3.4	65	3.27	72	3.55	67	4	58	4.1	58
Morocco	3.4	67	3.1	87	3.1	84	3.44	73	3.53	82	3.9	64
Tunisia	4	44	3.7	47	3.81	42	3.78	53	3.51	84	3.6	81
Lebanon	..	..	..	..	2.82	100	3.02	105	3.45	90	3.6	86
Egypt	3.4	72	3.4	72	3.37	65	3.42	74	3.45	89	3.5	90
Algeria	3.2	78	2.6	119	2.42	129	2.66	127	2.66	134	2.7	129
Libya	..	..	2.7	111	2.7	105	..	..	2.56	139	2.5	136
Yemen	..	..	..	..	..	..	2.16	141	2.44	143	2.5	135
Syrian Arab Republic	..	..	2.8	106	2.35	131	2.79	116	..	..	..	..
Regional average	3.8		3.5		3.4		3.6		3.88		4.01	

Source: WEF, Global Information Technology Reports, from 2007 to 2015.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.

GCC countries because of rapid developments in some and delays in others.

Tables 3.3 and 3.4 also show that the average values of the readiness sub-index in the region exceed the average values of the usage sub-index, and that both are partially in line with global averages. This situation reflects many lost opportunities and requires increased efforts to ardently promote ICT usage. Moreover, efforts should aim to decrease access costs, increase public access to information and improve digital content.

B. Access to digital content

Access to information and knowledge can take many forms, including access to digital content at affordable prices in the form of bulletins, archives, library services or statistical data. ICT can help overcome financial, cultural, linguistic and social obstacles to accessing digital content. The infrastructure pillar of the readiness sub-index of the Networked Readiness Index comprises an individual indicator that measures digital content accessibility. Table 3.5 shows the values of this individual indicator in several Arab countries for the period 2009-2014, which can be compared with the Index values in table 3.1. Table 3.5 shows that GCC countries have surpassed other Arab countries, excluding Jordan which ranked sixth. Although average values for the Arab region are similar to global values, many variations exist between countries. Qatar, the United Arab Emirates and Kuwait ranked highest in accessibility among Arab countries at the global level, coming in eighteenth place, twentieth place and fifty-first place,

Table 3.5. Accessibility to digital content in selected Arab countries, 2008-2014

Country	2008-2009		2010-2011		2012		2013		2014	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
Qatar	5.6	28	6.0	21	5.8	33	6.0	27	6.2	18
United Arab Emirates	5.3	34	5.9	26	5.9	30	6.1	23	6.1	20
Bahrain	5.5	29	5.9	28	6.1	19	5.9	31	5.7	38
Saudi Arabia	4.6	74	5.1	52	5.4	42	5.5	43	5.6	39
Kuwait	4.6	75	4.7	79	5.0	70	5.3	54	5.4	51
Jordan	5.1	46	5.2	45	5.3	50	5.4	48	5.3	54
Oman	4.6	77	5.1	56	5.5	41	5.3	53	5.1	75
Egypt	4.4	83	4.6	84	4.5	100	4.4	100	4.7	89
Morocco	4.4	82	4.5	95	4.6	93	4.5	96	4.5	99
Tunisia	5.0	48	4.9	61	4.8	79	..	..	4.3	110
Lebanon	..	..	4.8	71	4.5	94	4.2	110	4.2	115
Yemen	..	..	..	..	4.0	114	3.8	121	3.8	124
Syrian Arab Republic	3.0	128	3.3	130	3.7	121	..	..	..	..
Libya	3.6	112	4.4	97	..	..	3.5	131	3.4	139
Algeria	3.2	125	3.6	122	3.6	126	3.3	137	3	144
Regional average	4.53		4.86		4.91		4.86		4.81	
Global average	4.66		4.84		4.9		4.9		4.9	

Source: WEF, Global Information Technology Reports, from 2007 to 2014.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.

respectively, compared with twenty-third place, twenty-fourth place and seventy-second place, respectively, in the Networked Readiness Index. Bahrain and Saudi Arabia ranked lower in accessibility than in the Index, but shortfalls were particularly obvious in Oman, Tunisia and Lebanon, whose accessibility rankings were much lower than their Index rankings by 35, 23 and 18 positions, respectively.

Weak accessibility in some Arab countries can be attributed to several factors, including limited DAC, lack of laws ensuring the right to access information, a relative drop in broadband penetration rates, and increases in service costs.

C. Prices of ICT services

The International Telecommunications Union (ITU) has developed the ICT Price Basket as a benchmarking tool to analyse access to ICT services. Fixed and mobile telephones and fixed broadband services were assigned the same price, which is unfair for developing countries where the mobile telephone sector is the strongest. Moreover, this pricing system does not take into account developments in mobile broadband services, which are becoming more popular with the spread of 3G and other mobile services. Data on prices of fixed broadband services assist in determining obstacles to accessing information.

Table 3.6 compares ICT prices as a percentage of gross national income (GNI) per capita in selected Arab countries,[2] and highlights significant variations in the price of fixed broadband services that range from 0.4 per cent of GNI per capita in Kuwait to 6 per cent of GNI per capita in the Sudan. Moreover, fixed broadband services are the most expensive in the ICT price basket for most Arab countries; in most countries fixed broadband costs twice as much as fixed or mobile telephone services. Egypt ranks above Jordan, for example, although GNI per capita is lower than in Jordan (table 3.6).

Data contained in table 3.6 highlight a correlation between the value of the ICT price basket, especially the ability to purchase fixed broadband services, and Internet penetration rates in the Arab region. Although it is likely that the ability to purchase ICT services and their penetration rates are tied to GDP and other human development factors, data show a negative correlation between fixed broadband prices and Internet penetration rates in 2013. For example, Bahrain, Kuwait, Oman, Qatar and the United Arab Emirates registered the highest Internet penetration rates, although they recorded the lowest values in the fixed broadband sub-basket. In least developed countries, especially Algeria and the Sudan, broadband service cost are higher than in more developed countries and Internet penetration rates are lower.

D. Public domain information

Most Arab countries, to varying degrees, have launched projects and initiatives to make official information available to the public, in line with e-government programmes, given that the availability and exchange of information strengthen good governance and broaden development horizons. E-government has gone beyond the provision of electronic services to include the establishment of systems that support transparency, participation and cooperation, and the adoption of strategies that strengthen open government. As a result, a trend has emerged to make public data available to all and publish open government data. Under these initiatives, government departments now allow citizens, the media and other stakeholders to directly access large public databases.

Open government data have gained a promising development value because of their varied uses by individuals and institutions in the public and private

Table 3.6. Selected Arab countries ranked according to the ICT price basket, 2008-2013

Country	2008						2010					
	Global ranking	GNI per capita (thousands of dollars)	Sub-baskets (percentage of GNI per capita)			ICT price basket value	Global ranking	GNI per capita (thousands of dollars)	Sub-baskets (percentage of GNI per capita)			ICT price basket value
			Fixed telephone	Mobile telephone	Fixed broad-band				Fixed telephone	Mobile telephone	Fixed broad-band	
Algeria	..	..	..	..	..	..	..	..	..	..	..	..
Bahrain	18	19.35	0.3	0.4	1.7	0.8	18	25.42	0.2	0.7	1.3	0.7
Egypt	67	1.58	2.3	3.6	6.3	4.1	78	2.07	1.7	4.1	4.6	3.5
Iraq	..	..	..	.. ..	.. ..	..	..	..	..	..	..	..
Jordan	82	2.85	3.5	1.9	13.0	6.1	84	3.89	2.9	3.2	5.7	3.9
Kuwait	20	31.64	0.4	0.3	1.8	0.8	..	..	..	..	..	..
Lebanon	65	5.77	2.3	4.6	4.8	3.9	72	8.06	1.5	4.1	3.4	3.0
Morocco	..	..	.. ..	..	..	..	..	..	..	..	..	..
Oman	51	11.12	3.5	0.6	3.4	2.5	39	17.89	0.9	0.6	2.1	1.2
Qatar	..	..	..	..	..	..	70	12	0.9	1.8	5.5	2.7
Saudi Arabia	35	15.44	0.7	0.7	3.1	1.5	36	17.7	0.6	1.0	1.8	1.1
Sudan	108	0.96	5.5	6.0	36.4	16.0	..	..	..	..	..	..
Syrian Arab Republic	1.6	1.76	0.9	6.2	35.0	14.0	107	2.41	0.6	9.9	10.8	7.1
Tunisia	..	..	..	..	..	..	..	..	..	..	..	..
United Arab Emirates	6	23.95	0.3	0.2	1.1	0.5	5	57.34	0.1	0.2	0.8	0.4
Yemen	120	0.87	1.2	6.7	311.4	36.0	144	1.06	1.2	9.2	134.9	36.8

Country	2011							2013						
	Global ranking	Fixed broadband penetration (%)	GNI per capita (thousands of dollars)	Sub-baskets (percentage of GNI per capita)			ICT price basket value	Global ranking	Internet service penetration (%)	GNI per capita (thousands of dollars)	Sub-baskets (percentage of GNI per capita)			ICT price basket value
				Fixed telephone	Mobile telephone	Fixed broadband					Fixed telephone	Mobile telephone	Fixed broadband	
Algeria	79	2.8	4.45	1.7	3.7	4.8	3.4	88	16.5	5.29	1.3	2.9	4.4	2.9
Bahrain	15	13.8	25.42	0.2	0.7	1.3	0.7	28	90	19.75	0.3	0.7	1.6	0.9
Egypt	75	1.8	2.42	1.3	3.4	4	2.9	68	29.4	3.16	1	2.1	2.5	1.8
Iraq	141	...	2.34	0.2	6.4	108.3	35.5	..	..	..	..	..	..	..
Jordan	91	3.2	4.34	2.6	2.9	6.2	3.9	89	41	4.95	2.3	1.9	4.6	2.9
Kuwait	..	..	..	..	..	..	..	3	75.46	45.89	0.3	0.4	0.4	0.3
Lebanon	64	4.9	8.88	1.6	3.4	2.4	2.5	74	70.5	9.87	1.4	3	2.1	2.2
Morocco	100	1.8	2.85	0.9	9.4	4.9	5.1	101	56	3.03	0.9	5.2	4.7	3.6
Oman	30	1.8	18.26	0.9	0.6	1.7	1	19	66.45	25.50	0.5	0.4	1.2	0.7
Qatar	4	8.7	71	0.2	0.3	0.9	0.5	4	85.3	85.55	0.1	0.3	0.8	0.4
Saudi Arabia	41	5.6	16.19	1	1	2	1.3	48	60.5	26.20	1.2	0.6	1.8	1.2
Sudan	121	0	1.27	5.7	5.7	27.4	12.9	112	22.7	1.13	3.9	3.9	6.1	4.6
Syrian Arab Republic	109	0.6	2.75	0.5	9.3	9.4	6.4	..	..	..	..	..	..	..
Tunisia	66	5.1	4.16	1.7	2.9	3	2.5	61	43.8	4.36	1.4	1.6	1.7	1.6
United Arab Emirates	6	11	41.93	0.1	0.3	1.2	0.5	22	88	39	0.3	0.3	1.7	0.8
Yemen	119	0.4	1.07	1.1	12.6	18.7	10.8	..	..	..	..	..	..	..

Source: International Telecommunication Union (ITU) (2012), Measuring the Information Society Report 2012.
Note: GNI per capita is measured using the Atlas method of the World Bank.

Table 3.7. Selected Arab countries ranked according to their open data initiatives, 2015

Country	Open data indicator		Sub-indicator on readiness	Sub-indicator on implementation	Sub-indicator on impact	Maturity ranking
	Rank	Value	Value	Value	Value	
Tunisia	45	28.57	58	19	30	Emerging and progressing initiatives
United Arab Emirates	52	24.86	53	22	8	Unilateral initiatives
Morocco	55	21.11	47	15	18	Emerging and progressing initiatives
Saudi Arabia	59	15.77	38	15	0	Unilateral initiatives
Jordan	61	15.49	40	14	0	Limited capacity initiatives
Bahrain	61	15.38	43	13	0	Unilateral initiatives
Egypt	64	14.17	27	16	0	Limited capacity initiatives
Qatar	64	13.97	46	9	0	Unilateral initiatives
Yemen	82	5.80	12	7	3	Limited capacity initiatives

Source: The World Wide Web Foundation, Open Data Barometer Global Report, 2015.

sectors and by civil society organizations. The process of analysing and employing open data has become vital to researchers in most developing countries to promote innovation and improve outputs and services in the private sector, on the one hand, and to increase the efficiency of Governments and their services, measure the effects of public policies and promote mechanisms for transparency, oversight, participation and accountability, on the other hand.

Many Arab countries have launched initiatives on open government data. By mid-2015, ten ESCWA member States, namely all GCC countries, Egypt, Jordan, Morocco and Tunisia, had developed government websites or portals for open government data, with varying functions, development levels, services and data between these countries.

The Open Data Barometer Global Report[3] is a useful reference when analysing the implementation of open data initiatives in the region, given that it monitors such initiatives across the world and measures their effects. It also evaluates global trends and provides comparative data on several countries and regions through a detailed approach that combines contextual data and evaluation sub-indicators to determine three key open data dimensions, namely readiness, implementation and impact.

Table 3.7 sets out open data initiatives in nine of 88 Arab countries covered by the Open Data Barometer Global Report. These initiatives are spread over four country categories, and ranked from lowest to highest, as follows: limited capacity initiatives, unilateral initiatives, emerging and progressing

Table 3.8. Open government data initiatives in the Arab region

Country	Initiative/ website	Description	Website address
Bahrain	Open Data Platform	The Open Data Platform publishes data sets from various ministries and government bodies in formats that facilitate their processing, reuse and accessibility to all, so as to increase transparency and promote electronic participation.	www.bahrain.bh/wps/portal/data
Jordan	National Information System	Information produced by national institutions in Jordan in the public and private sectors, including official information, texts and statistics that cover statistical data, economic and social indicators and data from public and civil institutions.	www.nis.jo
Morocco	Moroccan Administration Open Data	This website comes under the e-government project developed by the new Ministry of Industry, Trade and New Technologies, placing data from several bodies under one portal in a format that facilitates their use and accessibility.	data.gov.ma
Oman	National Open Data Initiative	The national open data initiative encourages all government bodies to make public their data archives so as to establish an interactive and collaborative Government, characterized by transparency.	www.oman.om/opendata
Qatar	Qatar Information Exchange "*Qalam*"	Open data in Qatar is published on the Qalam data exchange website. It is an ambitious national project aimed at providing national information and data from government bodies and ministries, in various formats such as PDF, Excel and CSV.	portal.www.gov.qa/wps/portal/opendata
Saudi Arabia	Government Open Data	Government open data come under the national portal for government e-transactions, which provides a broad range of information in various formats such as PDF, Excel and XML. This information covers several topics, including weather conditions, domestic and international trade, training and education, social services, population and households, health, energy and water, transport and communications, and the labour market.	www.saudi.gov.sa/wps/portal/yesserRoot/aboutKingdom/openGovernmentData
Tunisia	Liberate Your Data for Tunisia	The private sector oversees this project that comes under corporate social responsibility. A company called Web Design launched this initiative, aimed at collecting and providing public data that can be downloaded free of charge and made available to all in a simple format.	www.opendata.tn
United Arab Emirates	Bayanat.ae	This project allows access to government data and information in a way that facilitates their use. Its files are available in XML, Word and PDF formats.	www.government.ae/en/web/guest/uae-data

Source: ESCWA.

initiatives, and high capacity initiatives. Arab countries covered by the Report were placed in the first three categories only.

Morocco and Tunisia fell into the third country category on emerging and progressing initiatives. These countries have open data programmes in the form of specialized initiatives, which are sometimes developed as part of public policy. Many of these countries focus on innovation when formulating open data policies, and on ensuring that they meet citizens' needs. Tunisia established its open data portal in 2012, and continues to update it

regularly. However, the site is facing several challenges, mainly limited usage especially by civil society. Although Morocco established the first open data portal in Africa, data quality, periodicity and timeliness remain limited because initiatives launched by specialized government bodies are separate and independent; in other words, they do not come under public strategies.

Bahrain, Qatar, Saudi Arabia and the United Arab Emirates fell into the second country category on unilateral initiatives. These countries' open data initiatives include establishing government department websites that publish open data lists and specialized open data portals. However, government efforts to publish selected data sets go beyond the capacity of the private sector and civil society to use these data freely and effectively. Consequently, these initiatives appear one-sided and not concerned with including a wide segment of users.

Nevertheless, GCC countries have reached satisfactory readiness levels that allow stakeholders to effectively use open data, but these efforts remain limited because they have not resulted in any tangible economic or social effects. The United Arab Emirates ranked highest in the readiness sub-indicator, because of its strong commitment to open data policies developed under its e-government initiative. All GCC countries have linked their open data initiatives to e-government programmes, rather than adopting a single open government model founded mainly on open data.

Egypt, Jordan and Yemen fell into the first country category on limited capacity initiatives. These countries are facing several challenges that make the launch of sustainable open data initiatives very difficult, including weak stakeholder capacity (Government, civil society and the private sector), high Internet access prices, weaknesses in collecting and managing digital data, lack of suitable training, and absence of technical capacity to use open data.

Despite progress in the region towards open data initiatives, countries still need to tackle several shortfalls to benefit from and promote such initiatives. Reforms should include bridging legislative gaps; enhancing the participation of non-governmental actors; improving the quality of published data; raising awareness; and building the capacity of public sector staff to employ these initiatives. Table 3.8 sets out open government data initiatives in the Arab region.

Regarding public libraries, there are nascent efforts in the Arab region to digitize books and make them available to the public. In the Syrian Arab Republic, the Al-Assad National Library has made available various books, manuscripts and documents in databases and archives that can be accessed through data communication networks. Moreover, the Egyptian Libraries Network has been developed, which includes a consolidated index of 158 libraries whose texts have been added to an automated library system, developed by the Information and Decision Support Centre, which can be continually updated.

A legislative approach is also required to ensure the public's right to access open data. Several Arab countries have adopted the necessary legislation, including Jordan which issued law No. 47/2007 that guarantees the right to access data; Tunisia that endorsed a decree in 2011 allowing access to administrative documents; and Yemen that adopted law No. 13 of 2012 which is a comprehensive legal text on the right to access information. Efforts are continuing to issue similar laws in other Arab countries.

E. Community access points

Multipurpose community access points (CAP) are a key method of providing inclusive access to information, especially in rural areas - they provide services either free of charge or at nominal rates. CAP are often

Table 3.9. Multipurpose CAP projects in the Arab region

Country	CAP	Description of activities and website
Egypt	Telecentres in Community Development	These telecentres were launched following an initiative by the Ministry of Communications and Information Technology. They comprise teams from the private sector, individuals and local communities, and provide a solution to cost challenges ($0.2 per hour). At the end of 2010, there were 2,164 telecentres, and a further 300 are expected to be established every year. These telecentres have provided their services to over 1 million users, and have created over 8,000 job opportunities. The Ministry implemented a new initiative in 2011 entitled "Technology houses", which had established 123 houses by mid-2013. (See www.telecenter-egypt.com).
Jordan	Knowledge stations	There were 197 knowledge stations in 2015, 28 of which in extremely poor areas. They assist in bridging the digital divide and in facilitating ICT usage in many fields. Over 1.6 citizens benefited from their services in 2013. It should be noted that the number of women trainees exceeded that of men trainees by a 3:2 ratio. (See www.ks.gov.jo).
Oman	Community Knowledge Centres	These centres train both men and women from all social backgrounds to build their ICT capacities and their digital skills. By mid-2013, there were 19 centres, including nine for women in collaboration with the Omani Women's Association. Since their launch throughout Oman, 23,898 trainees have benefited from their services, including 5,637 women. (See www.ita.gov.om/ITAPortal/eServices/Popular_Projects.aspx?NID=84 and www.ita.gov.om/ITAPortal/MediaCenter/NewsDetail.aspx?NID=326).
Qatar	Internet Parks (iParks)	The Supreme Council of Information and Communication Technology developed the iParks initiative in 2007, in collaboration with the Ministry of Municipality and Urban Planning. Since 2011, the number of parks providing free wireless Internet services has increased from three to five throughout the country. According to surveys conducted between 2009 and 2010, the number of users in the first three parks exceeded 10,000 per month, and over 100,000 persons used the parks in the first year. (See www.ictqatar.qa/en/news-events/news/qatar%E2%80%99s-iparks-initiative-expanded-two-new-parks-services-upgraded).
Syrian Arab Republic	Community access points (Rural Knowledge Network - ReefNet)	In 2002, through a partnership between the Ministry of Communications and Technology and the United Nations Development Programme, the community access point programme was launched, aimed at promoting ICT usage within all social and demographic groups, especially in rural areas. These points were marketed as cultural community centres for capacity building and awareness raising, not just ICT services. By 2009, around 24,500 persons had participated in training activities, 48 per cent of whom were women. (See www.reefnet.gov.sy).

Source: ESCWA.

available in public areas, such as libraries, schools, post offices and civil society organizations. Before 2003, most Arab Governments had established multipurpose CAP, in collaboration with non-governmental national, regional and international organizations. There are variations in CAP sizes, services, target groups and coverage areas. Their main aim is to provide access to various ICT services, especially the Internet, to build capacity in the ICT sector and to exchange knowledge.

As a result of steady increases in ICT penetration rates, CAP have moved from offering traditional services to providing more specialized services. They have also broadened the scope of their activities to include rural areas and specific issues, such as those related to persons with special needs and women. Table 3.9 sets out examples of successful CAP projects in the Arab region.

In addition to ICT access centres, several countries have launched social portals in

Table 3.10. Selected initiatives to promote access to digital content in the Arab region

Country	Social portal	Description of activities and website
Egypt	Community development portal – Kenana Online	The portal enables users to build Internet databases and provide communities with information and advisory services. In 2007, there were 750,000 pages on the portal and 39,000,000 visitors. The number of articles in its archive has risen from 15,000 to 50,000. The portal has received esteemed prizes, including the Stockholm Prize, E-India, the Arab eContent Award and the World Summit Award. (See www.kenanaonline.com).
Iraq	Virtual library	The Ministry of Higher Education and Scientific Research established the library, with support from the Research Foundation for Analysis and Development. A total of 25 universities and five ministries have joined the library, which comes under the public plan to improve accessibility to information in Iraq. Statistics show that, in 2008, around 306,000 books and research papers were downloaded from this library. (www.ivsl.org/enter.html not currently operational).
Qatar	Mada	The Qatar Assistive Technology Centre (Mada) launched an initiative at the end of 2010, empowering persons with special needs to use ICT. The Centre also formed a partnership with bookshore.org in 2011, to provide digital content to persons whose disabilities prevent them from reading printed text. Over 85,000 electronic books will be made available free of charge to people who cannot read printed text because of a disability. (See mada.org.qa/en/).
Syrian Arab Republic	Rural knowledge network	The rural knowledge network (Reefnet) was launched under a project to utilize ICT in development, implemented by the Ministry of Communications and Information Technology and the United Nations Development Programme, which entails establishing access points for rural communities. The network, which comprises 97 electronic sites specific to villages and towns, provides access to information, facilitates its exchange and promotes knowledge warehouses. As a result of its Arabic content (multiple forums, a health encyclopaedia and Arabic educational content), the network contributes to exchanging expertise and building the knowledge society in the region. In 2010, the main portal attracted over 10,000 visitors a day. (See www.reefnet.gov.sy).

Source: Community portal websites.

Arabic aimed at providing online information of interest to local communities and Arab societies in general. Table 3.10 sets out some activities aimed at promoting access to digital content in the Arab region.

F. Maturity levels of access to knowledge and information in selected Arab countries

Selected Arab countries can be divided into the following four maturity levels, according to developments in access to knowledge and information over the period 2007-2015 (table 3.11):

Maturity level 1: countries with a drop in broadband penetration rates, an increase in Internet costs as a percentage of per capita income, a lack of ICT access centres in rural and remote areas, and limited digital information available to the public.

Maturity level 2: countries with a relative increase in broadband penetration rates, affordable Internet services, some laws on accessing information, digital information available to the public despite some limitations, and a few initiatives that facilitate access to information in rural areas.

Maturity level 3: countries with satisfactory broadband penetration rates, widespread

Table 3.11. Maturity levels of access to information and knowledge in selected Arab countries

Country	2007	2009	2011	2013	2015
Bahrain	3	3	4	4	4
Egypt	2	3	3	3	3
Iraq	1	2	2	1	1
Jordan	2	2	2	2	3
Kuwait	3	3	3	3	3
Lebanon	2	2	2	2	2
Libya	-	-	-	1	1
Morocco	-	-	-	2	2
Oman	2	3	3	3	3
Palestine	1	1	2	1	1
Qatar	3	3	4	4	4
Saudi Arabia	2	2	2	3	3
Sudan	-	1	1	1	1
Syrian Arab Republic	1	2	2	1	1
Tunisia	-	-	-	2	2
United Arab Emirates	3	3	3	4	4
Yemen	1	1	1	2	1
Regional average	2.0	2.2	2.4	2.3	2.3

Source: ESCWA.

use of broadband services, a drop in Internet service costs, and initiatives allowing access to information in remote and poor areas.

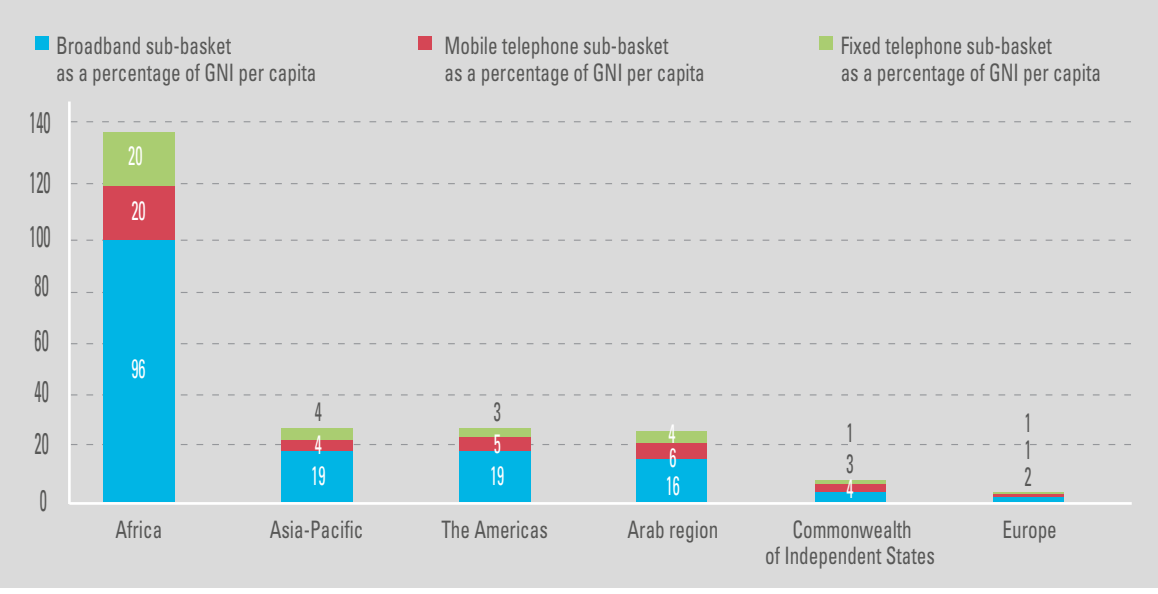
Maturity level 4: countries with high broadband penetration rates, a drop in subscription costs, widespread use of broadband services, digital databases available to the public, and initiatives that facilitate public access to information in marginalized areas.

G. Comparative performance of the Arab region

Access to information and support for information exchange are significant challenges for the Arab region. Although most countries have made progress, prominent variations in availability of and access to information exist within and between countries, and concerted efforts are needed to improve access conditions to national digital content.

Obstacles to accessing information in the Arab region include the high cost of some ICT services as a percentage of per capita income. Using the ICT price basket as an indicator to assess the availability of affordable services in relation to income (figure 3.1) shows that the Arab region is one of the most expensive regions in the world for ICT, only surpassed by Africa and the Asia-Pacific region. Fixed broadband is the most costly service in the region, at 16 per cent of GNI per capita compared with 2 per cent in Europe.

Figure 3.1. Prices of ICT services by region and development levels, 2011



Source: ESCWA, based on ITU, Measuring the Information Society report 2012. www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf.

H. Conclusion

Access to information and knowledge in the Arab region has many strengths and weaknesses.

1. Strengths

- The high value of the individual indicator on the economic and social impact of ICT, and the high value of the individual indicator on access to digital content, especially in GCC countries
- Implementation of activities and initiatives to strengthen access to digital content and open data in the Arab region, including community access points.

2. Weaknesses

- Weak legislation on the right to access information, especially public information
- Low ICT usage compared with readiness levels
- Relatively high ICT service costs, especially fixed broadband services.

3. Recommendations

- Strengthen access to Internet services by reducing broadband subscription costs to ensure affordability for the majority of citizens
- Increase demand for e-services and expand ICT usage by raising awareness and building capacity to encourage all stakeholders, especially individuals and businesses, to use ICT
- Implement accessibility policies and initiatives to include all citizens in the Internet field, especially women, persons with special needs and inhabitants of remote, rural or marginalized areas
- Increase DAC and ensure its development through collaboration between Arab countries, so as to encourage its use by large segments of the population, including local communities and women; and provide free access to digital content to promote knowledge generation and exchange
- Adopt legislation on accessing information to ensure free access to information in

general, and to public information in particular
- Launch and support government initiatives that allow free and open access to public information, especially open data initiatives
- Develop customs and tax policies to promote ICT usage.

Despite increased awareness in Arab countries of the importance of technology and its uses, education methods have not markedly changed and remain incompatible with global technological capacities.

4. ICT capacity-building

Human resources are the main pillar in any plan to achieve sustainable economic and social development. Consequently, building an information and knowledge society entails developing human and institutional resources in the ICT field. As a result of high literacy rates among both men and women in the Arab region (box 4.1), computer usage, improved education and quality research and innovation have become key to building a knowledge-based economy.

ICT plays a vital role at all education levels. It can be used as an effective education tool, or to strengthen the skills and expertise required for an information society. ICT capacity-building therefore provides employment opportunities and a brighter future for young people in Arab countries, given that it bridges education gaps that prevent young people from gaining necessary specialized and interpersonal skills.

There are many aspects and levels of ICT capacity-building, most notably awareness raising, technology dissemination, computer usage in schools, vocational training, specialized university training, and research, development and innovation.

A. Achievements in ICT capacity-building

1. Awareness raising and technology dissemination

Over the period 2003-2015, most Arab countries made concerted efforts to propagate ICT and raise awareness of its importance and the need to use it at home and at work; introducing the International Computer Driving Licence (ICDL) and establishing community access points were key steps taken by Arab countries in this field.

Box 4.1. Literacy in the Arab region

Adult literacy rates rose significantly in all Arab countries over the period 2003-2015.* In Qatar, the literacy rate reached 97.75 per cent in 2015, compared with 88.96 per cent in 2003. Tunisia recorded a rate of 81.78 per cent in 2015, compared with 74.3 per cent in 2003. However, literacy rates are low in several least developed countries, with 70 per cent in Yemen in 2015 although markedly higher than in 2003 at 54.2 per cent.

Despite an increase in literacy rates among women over the same period, the literacy gender gap remains large. In 2015, adult male literacy was 98.48 per cent in Palestine compared with 94.77 per cent for women. The gap is much larger in other Arab countries, including Yemen where the male rate was 85.12 per cent compared with only 55 per cent for women.

Source: http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS&popupcustomise=true&lang=en.
*2015 data are estimates.

(a) International Computer Driving Licence

The International Computer Driving Licence is a basic computer skills certificate; mastering ICT demands more than these basic skills. Around 15 years ago, the UNESCO Office in Cairo provided licences for training, testing and issuing certificates in Arab countries. Since then, ICDL has become a requirement for employment or promotion in many Arab countries. By 2013, 68,020 women and 44,444 men had been awarded a licence in Jordan. Over the period 2010-2011, around 54,100 licences were issued in the Syrian Arab Republic. Egypt issued 836,801 licences between 2006 and 2012, and Saudi Arabia issued over 99,438 from 2003 to 2012. In September 2014, the European Computer Driving Licence Foundation announced its partnership with the ICDL GCC Foundation to launch ICDL Arabia in Egypt, Iraq and GCC countries.

Despite the widespread use of personal computers in most countries across the world, some Arab countries still require ICDL for employment or promotion. For example, Kuwait has made ICDL an employment requirement for the public sector and has trained 1,342 public sector technical experts in other programmes, including CCNA, CCNP and CISS.

(b) Community access points

Community access points allow the public to access ICT free of charge or at nominal costs. These points have many different names, including Internet forums, telecommunications centres, IT clubs and knowledge stations. They organize training sessions for local communities and facilitate citizen access to e-services. Table 3.10 in chapter III of the present study sets out some community access points in Arab countries.

2. Computer usage in education

Over the period 2003-2015, computer usage and Internet connectivity became widespread in primary and secondary schools in most Arab countries. IT was included as a subject on many curriculums, and teachers were trained to use ICT in education. For example, in the Syrian Arab Republic, around 1,600 of 2,200 schools were connected to the Internet. Table 4.1 shows developments in the indicator on access to the Internet in schools, which ranges between 1 and 7, in selected Arab countries over the period 2004-2015.

In Egypt, an education initiative was launched in partnership between the public and private sectors to improve education through the effective use of ICT. Moreover, the E-Learning Competence Centre was set up following collaboration between the Ministry of Communications and Information Technology and Cisco, which aims to develop ICT skills by providing e-learning programmes. In 2013, 24.1 per cent of private schools and 17 per cent of government schools in the Arab region used pedagogical software. However, only 10 per cent of pupils can access social networks in the Arab region.

To optimize the impact of ICT in education, most initiatives are implemented through education organizations. These initiatives include developing an education portal for students, teachers, administrators and parents, in line with their specific needs and usage regulations. For example, Oman has included IT in its curriculums and introduced e-learning tools in schools. It also launched the Education Portal in 2007 to support learning, teaching and administration, and to electronically connect schools to each other and to education departments and administrations.

Curriculums must be reviewed to ensure that they cover ICT knowledge and skills, in line with teacher capacity and training. For example, UNESCO has established the ICT Competency Framework for Teachers to train educators to efficiently assist students in using ICT and developing their computer skills. Training women remains a key priority for

Table 4.1. Internet access in schools in selected Arab countries

Country	2004	2009	2013	2014	2015
United Arab Emirates	5.6	4.96	5.8	5.8	6
Qatar	..	4.95	6.1	6	5.9
Bahrain	4.98	4.55	5.3	5	5.2
Jordan	4.38	3.87	4.9	5	5
Oman	..	3.89	5	4.9	4.6
Saudi Arabia	..	3.34	4.9	4.8	4.6
Kuwait	..	3.43	4.2	4.4	4.1
Lebanon		..	3.5	3.4	3.7
Tunisia	4.59	..	..	3.7	3.6
Morocco	3.52	3.35	3.5	3.1	3.3
Egypt	3.4	2.5	3	2.7	2.5
Algeria	1.87	2.23	2.4	2.2	2.4
Yemen	..	..	1.7	1.7	1.7
Libya	..	1.97	2.2	1.8	1.6
Regional average	4.05	3.55	4.04	3.89	3.87
Global average	..	3.63	4.1	4.2	4.3

Source: WEF, Global Information Technology Reports, from 2004 to 2014.
http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/#indicatorId=EOSQ084.
Note: the value of the index is an estimate of the extent of the Internet usage in education and it ranges between 1 and 7.

social and economic development in Arab countries. For example, in Yemen, women's movements have ardently supported this approach, and have requested technical assistance from international organizations and foreign aid agencies to organize ICT training programmes for women. In Oman, the Omani Women's Association, in collaboration with Microsoft, has developed a training programme on ICT literacy for women - a total of 11 centres have been established across the country, and 4,825 women had received training by 2013.

It is vital to improve education systems to prepare young people for the knowledge society and provide them with more employment opportunities for a brighter future. Knowledge of foreign languages, mathematics, science and IT, in addition to good communication and leadership skills, a sense of responsibility and self-respect and an ability to think logically and analytically are necessary in an information society. ICT can be effectively used for learning and teaching, given its ability to transform classrooms into more interactive environments where students can develop independent and innovative thinking. Social networks and mobile telephones contribute to modernizing education because of their open, interactive and participatory nature, thus providing access to a large number of peers for educational purposes, dialogue and debate.

3. Vocational training and specialized university education

The Arab region should provide life-long education and training opportunities, and should tackle the capacity challenges faced by graduates so as to meet market demand for ICT skills. Many initiatives and partnerships have been launched to promote vocational training, given its importance. For example, three centres have been established in the

Box 4.2. Tahrir Academy in Egypt

The Tahrir Academy has established a library of educational videos in Arabic. The target audience is children and young people, divided into two age groups: 3 to 18 and 18 to 35. The Academy was launched by volunteers from schools, universities and youth groups. It uses social networks, including YouTube, to reach a wider audience. It has uploaded 150 videos, and attracted 3 million viewers and 4,000 subscribers. Lessons cover basic physics, mathematics, IT and other key skills.

Source: www.tahriracademy.org.

Arab region to train for the first level of the Linux Certification. Egypt has established the Tahrir Academy (box 4.2); and the National Telecommunications Institute (NTI) was accredited by Cisco in 2006 to offer academic training on all Cisco programmes in the MENA region. NTI implements various activities in the region, provides training and support, and oversees 29 Cisco regional academies and 354 centres in many Arab countries, especially Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Oman, Palestine, Saudi Arabia, the Syrian Arab Republic, Tunisia and Yemen.

Specialized technical training forms part of capacity-building activities. Partnerships between Governments and international actors have led to the development of joint capacity-building programmes on technical skills, and have assisted some countries in building their labour force and citizens' technical skills. Cisco, Intel and Microsoft, among other companies, have implemented training initiatives in Egypt, Jordan, Kuwait, Lebanon, Oman and Palestine, including the execution of an ESCWA programme entitled "The Iraqi Networking Academies" between 2004 and 2007 aimed at providing networking training to Iraqi engineers and university students under the Cisco academic programme.[1] ESCWA also launched the Academy of ICT Essentials for Government Leaders over the period 2013-2015,[2] aimed at building government leaders' capacity in the Arab region in the field of ICT for development. The Academy will assist the Governments of ESCWA member States in strengthening their capacity to provide an environment that promotes a move towards the knowledge economy and ensures its sustainability.

Most Arab countries are committed to ensuring the graduation of students specializing in ICT. Although they only began developing and implementing curriculums and programmes in the mid-1990s, the number of graduates rose in 2000. For example, the Egyptian Government aims to achieve a compound annual increase of 30 per cent in ICT education. It has focused its efforts on computer programming and network design and implementation by using local area networks and connecting institutions to the Internet. ICT university programmes have followed market demands in both the education and employment fields. Universities have become more competitive by launching partnerships with the private sector, and by providing advanced higher education programmes. Over the period 2003-2015, private universities in most Arab countries provided ICT programmes and increased the number of ICT graduates.

4. Research, development and innovation

(a) ICT infrastructure for higher education and research

It is vital to connect sister academic centres and institutions via high-speed research

Table 4.2. Research and education networks in selected Arab countries

Country	Name and website	Bandwidth	Details
Algeria	Algerian Research Network (ARN) www.arn.dz	622 Mb/s	Linked to GEANT, and connects 116 bodies including universities, research centres, government schools and preparatory schools.
Bahrain	Bahrain Research and Education Network (BahREN)	Under consideration	
Egypt	Egypt Universities Network (EUN) www.eun.eg	From 34 Mb/s to 1 GB/s	It connects main service providers at a speed ranging between 34 Mb/s and 1 GB/s. It also connects to the international Internet at a speed of 2 GB/s, and 1 GB/s via Internet2.
Iraq	Iraq Research and Education Network (IraqREN)	…	
Jordan	Jordanian Universities Network (JUNet) www.junet.edu.jo	1GB/s	
Kuwait	Under consideration	...	Part of the Brain Gain initiative launched by UNESCO, in collaboration with Hewlett Packard.
Morocco	Moroccan Academic and Research Wide Area Network (MARWAN) www.marwan.ma	2-100 Mb/s	It falls under the National Centre for Scientific and Technical Research. It was updated from MARWAN 1 to MARWAN 2, then to MARWAN 3. It connects universities, research centres, higher education institutions and ministerial research departments.
Oman	Oman Research and Education Network (OMREN) www.trc.gov.om	....	Oman Research and Education Network (OMREN).
Palestine	Palestinian National Research and Education Network (PalNREN)	45 Mb/s	Connected to EUMEDCONNECT3.
Qatar	Qatar National Research and Education Network (QNREN) www.qnren.qa	100 GB/s (backbone)	Connected to US Internet 2 REN.
Saudi Arabia	Saudi Academic Research and Innovation Network (SARInet) www.sarinet.org.sa	1 GB/s	Managed by King Abdulaziz City for Science and Technology, and connected to GEANT.
Sudan	Sudanese Research and Education Network (SudREN) www.sudren.edu.sd	450 Mb/s at two points	Connected to UbuntuNET and the African Research and Education Network via AfricaConnect.
Syrian Arab Republic	Syrian Higher Education and Research Network (SHERN)	...	Given the current situation, SHERN is no longer connected to international scientific research networks.
Tunisia	Réseau National Universitaire (RNU) www.cck.rnu.tn	6 GB/s	Connects universities, administrations, dormitories, university canteens and Tunisian research centres.
United Arab Emirates	UAE Advanced Network for Research and Education (Ankabut) www.ankabut.ae	155.52 Mb/s (at the international level), 10 Gb/s (backbone), and 1 GB/s (accessibility)	Linked to international research networks, including S-Internet2 and to the European scientific research network GEANT.

Source: www.asrenorg.net/about/partners-and-members/national-networks.htm; and http://www.asrenorg.net/?q=content/arab-nrens.

and education networks to enable resource and knowledge exchange between them. While several Arab countries have developed networks with bandwidths ranging between 2 Mb/s and 1 GB/s, bandwidth in Qatar has reached 100GB/s. These networks have flourished over the past two years in the Arab region. Bandwidth has increased from 622 Mb/s to 1.4 GB/s in Algeria; from 20-100 Mb/s to 6 GB/s in Tunisia; and from 40 GB/s to 100 GB/s in Qatar. Bandwidth growth has remained weak in Bahrain, Lebanon and Libya, and unchanged in the Syrian Arab Republic and Yemen because of political instability.[3] Partnerships and collaboration between education institutions and research centres must be promoted in Arab countries to improve scientific research, development and innovation, given that networks are tools that only encourage partnerships and facilitate interaction and knowledge exchange. Table 4.2 sets out the status of such networks in selected Arab countries.

(b) Free and open-source software

Free and open-source software are an acceptable alternative to software subject to intellectual property rights or commercial licensing, especially when budgets are limited. Free and open-source software are not widespread in the Arab region, where most software is unlicensed or pirated. Individuals, national technology groups and private institutions and associations have been quicker to employ free and open-

Table 4.3. Local community bodies promoting the use of free and open-source software in the Arab region

Country	Entity	Description and role	Website
Bahrain	Bahrain Linux User Group	A group of individuals passionate about computers, especially the Linux operating system.	http://www.linuxbahrain.com
Egypt	Egypt GNU-Linux	Group of users working to promote open-source software in general, and GNU/Linux in Egypt in particular. The group also offers support services.	http://www.eglug.org
Jordan	Jordan Open Source Association	The Association consists of a group of students from various Jordanian universities. It aims to protect free and open-source software	http://jordanopensource.org
Kuwait	Kuwait Linux User Group	A group that promotes Linux, the Berkeley Software Distribution and open-source software in Kuwait.	http://www.q8linux.net
Lebanon	Lebanon GNU/Linux User Group	Specialized group on GNU/Linux and other open-source software.	http://www.leglug.org
Libya	Tripoli Linux User Group	Internet group that organizes workshops and study and training sessions on the Linux operating system.	http://tlug.ly
Palestine	Palestine Open Source Community	A non-profit organization that aims to highlight open-source benefits.	http://www.opensource.ps
Sudan	Nile Centre for Technology Research	The Centre comes under the National Communications Authority. It aims to form a group of open-source software users and to develop domestic skills and knowledge of the open-source field.	http://www.nctr.sd/en/index.php/nctr-opensource/suda-foss.html
United Arab Emirates	Open source community in the United Arab Emirates	Supporters of open-source software at Zayed University.	http://os-uae.org
Yemen	Yemeni Free Software and Open Source Association	Promotes the use of free and open-source software in Yemen.	http://www.yfosa.org

Source: ESCWA.

source software compared with the public sector, because of several private sector initiatives (table 4.3), notably Ma3bar[4] and the National Programme for Free and Open Source Technologies[5] at the King Abdulaziz City for Science and Technology in Saudi Arabia. These two initiatives promote the use of free and open-source software in both the public and private sectors, and support technical capacity-building in this field. Several Arab Governments have recognized the importance of free and open-source software in reducing costs, enhancing flexibility and improving interoperability. Egypt, Iraq, Libya, Oman, the Sudan and Tunisia have implemented initiatives to limit the effects of ICT sanctions imposed by the West. It should be noted that most challenges faced by free and open-source software in the region stem from their inefficiency in dealing with the Arabic language. The Academy of ICT Essentials for Government Leaders has highlighted the benefits of free and open-source software.[6]

(c) Research and development

Research and development are not priorities for the Arab region - most countries are focusing on resolving urgent issues rather than on long-term research and development investments. Arab countries lack national and regional mechanisms to transform information and knowledge into economic outputs. Moreover, research and development are not allocated significant funds in government budgets nor in long-term development programmes and strategies. However, most GCC countries are undergoing encouraging changes that might positively affect long-term research and development programmes in the field of ICT. These shortfalls, combined with an absence of long-term development strategies, impede the achievement of national economic progress and a flourishing ICT sector. Available data show that the Arab region as a whole earmarked $3.7 billion for scientific research in 2002, which is equivalent to only 0.5 per cent of the region's GDP. In 2009, $6.1 billion was spent on research and development, also equal to 0.5 per cent of GDP.

(d) Innovation

Although ICT innovation has become a key factor for improving economic performance and achieving social development, the Arab region remains unprepared to promote it. The Global Innovation Index, developed by European Institute for Business Administration (INSEAD) and the World Intellectual Property Organization (WIPO),[7] can be used to measure progress in innovation.

In 2014, the United Arab Emirates ranked first among Arab countries in the Index, followed by Saudi Arabia and Qatar. The rankings of some Arab countries improved in 2014, such as Algeria, Bahrain, Oman and the Syrian Arab Republic. Although Egypt and Morocco made significant progress in the global rankings, they still rank low at 99 and 84, respectively. Kuwait dropped 19 places and Tunisia dropped 8. Low Index results indicate a large gap between Arab and developed countries, and highlight the need to develop innovation and entrepreneurship in the region and increase collaborative efforts between Governments, investors businesses and policymakers.

Another innovation measure is the number of patent applications. Eight of 14 selected Arab countries remain below the patent threshold of 1 per 1 million persons (table 4.4). Patents reflect the status of economic development; it is worth noting that only 16 pioneering countries have exceeded the patent threshold globally. Switzerland, the most pioneering country, made 315 patent applications per one million persons over the period 2014-2015, followed by 15 countries with applications for 100-305 patents per million persons.[8]

Table 4.4. Number of patent applications per million persons under the Patent Cooperation Treaty and the global rankings of selected Arab countries, 2014-2015

Country	Patents per million persons	Global
Saudi Arabia	6.65	44
Qatar	6.37	46
United Arab Emirates	5.01	49
Lebanon	1.66	60
Tunisia	1.17	68
Bahrain	1.14	69
Oman	0.99	71
Egypt	0.59	77
Morocco	0.55	78
Kuwait	0.49	79
Jordan	0.45	82
Algeria	0.15	97
Libya	0	124
Yemen	0	124

Source: WEF, Global Competitiveness Report, 2014-2015. http://reports.weforum.org/global-competitiveness-report-2014-2015.

B. Maturity levels of ICT capacity-building in selected Arab countries

The rankings of ESCWA member States in the field of ICT capacity-building reflect qualitative measures taken in this field, such as awareness-raising campaigns; and quantative factors, including the number of graduates who join the labour force. The maturity of ICT capacity-building (table 4.5) can be divided into the following four categories:

Maturity level 1: countries with weak knowledge of the importance of ICT use, weak computer usage in schools, absence of IT vocational training and specialized university programmes, and a lack of ICT research, development and innovation activities.

Maturity level 2: countries with programmes to raise awareness and propagate data and information, IT training in curriculums and computers in schools, advanced vocational training and ICT university curriculums, satisfactory number of ICT university graduates, and nascent research, development and innovation activities.

Maturity level 3: countries with effective programmes to raise awareness and propagate data and information, constant increases in the number of computers in schools, vocational training that meets the labour market's quantative and qualitative demands, and progress in ICT research, development and innovation activities.

Maturity level 4: countries with high ICT awareness; effective strategies to propagate data and information; a large number of computers in schools; and good vocational training and advanced university programmes, leading to positive

Table 4.5. Maturity of ICT capacity-building in selected Arab countries

Country	2003	2005	2007	2009	2011	2013	2015
Bahrain	2	3	3	2	3	3	3
Egypt	3	3	3	3	3	3	3
Iraq	1	2	2	1	1	1	1
Jordan	3	3	3	3	3	3	4
Kuwait	2	2	2	2	3	3	3
Lebanon	2	2	2	3	3	3	3
Libya	-	-	-	-	-	1	1
Morocco	-	-	-	-	-	2	2
Oman	2	2	2	2	2	3	3
Palestine	2	2	2	2	2	2	2
Qatar	2	3	3	3	3	3	4
Saudi Arabia	2	2	2	3	3	3	3
Sudan	-	-	-	1	1	1	1
Syrian Arab Republic	2	2	2	3	2	2	2
Tunisia	-	-	-	-	-	3	3
United Arab Emirates	3	3	3	4	4	4	4
Yemen	2	2	2	2	1	1	1
Regional average	2.2	2.4	2.4	2.4	2.4	2.4	2.5

Source: ESCWA.
Note: Data do not cover Libya, Morocco and Tunisia before 2013, given that they joined ESCWA in 2012.

results in line with labour market needs and to increased efficiency of research, development and innovation activities.

C. Conclusion

The Arab region has several strengths and weaknesses in the field of ICT capacity-building.

1. Strengths

- Increased awareness of the importance of ICT and its use in the Arab region, along with higher Internet, personal computer and mobile telephone penetration rates, with some variations according to individuals' and countries' economic ability
- Widespread use of computers in schools, especially in GCC countries, and teacher IT training
- Collaboration with global companies and international organizations in providing ICT vocational training in most Arab countries.

2. Weaknesses

- Despite the widespread use of computers in schools and the inclusion of IT in

curriculums, teaching methods have not markedly changed and remain incompatible with available electronic tools
- Specialized university training in all ICT fields and applications remains limited, and lags behind fast-paced technological progress
- Limited budgets for research, development and innovation, even in GCC countries
- Absence of incentives to promote innovation.

3. Recommendations

- Update teaching curriculums, tools and methods through Internet use, smart phones, distance learning and social networks; and improve the Internet connectivity of education institutions to promote skills building and knowledge exchange towards a knowledge-based economy
- Broaden the scope of ICT vocational training programmes to include all education levels, and cover technological developments to ensure that curriculums are up to date
- Strengthen ICT academic training programmes and periodically update them to ensure that graduates have the necessary professional skills and expertise to meet labour market needs
- Develop programmes to empower women to use ICT in training, education and entrepreneurship
- Encourage young people and women to study engineering at university, and develop support mechanisms for employing these two groups in the public and private sectors
- Support the private sector in Arab countries and urge it to develop education tools and methods, so as to not be limited to importing education technologies
- Invite education institutions and ICT research centres in the Arab region to develop links with universities across the world and participate in research and education networks, so as to facilitate communication, exchange information and researchers, establish a developed education and research environment, and ensure high-level technological output
- Increase budgets allocated to scientific research and development, support and encourage researchers in propagating research findings trough ICT periodicals and journals, and protect their rights to promote innovation and entrepreneurship.

Several countries have developed comprehensive national cybersecurity strategies, adopted laws and regulations to combat cybercrimes, and formed computer emergency response teams and coordination centres.

5. Building confidence and security in the use of ICT

The danger of falling victim to cybercrime increases with the widespread use of ICT and its numerous applications, especially with the expanding use of the Internet, electronic transactions and social networks. Consequently, building trust in ICT is an important enabling factor. Technical, organizational, legal and institutional frameworks are needed, at the regional and national levels, to tighten cybersecurity and raise user awareness of the latest cybercrime ploys. Protecting children from Internet threats remains a priority that must be tackled in all frameworks for combating cybercrimes. Arab countries have begun taking steps to protect children and regional initiatives have been implemented in this regard, notably the Arab Convention on Combating Information Technology Offences.

A. Achievements in building confidence and security in the use of ICT

Over the past 10 years, most Arab countries have taken key measures to gradually build trust in ICT use and tighten cybersecurity by adopting laws on cybercrime. Significant progress has been made in building capacity to respond to cyberthreats - computer emergency response teams have been formed in the region following malware attacks on businesses, citizens and Governments. Cybersecurity authorities and bodies have also been established at the national level. As table 5.1 shows, such authorities have been set up in 14 of 17 Arab counties. However, not all national cybersecurity initiatives have the same maturity level. Several countries have developed comprehensive national cybersecurity strategies, adopted laws and regulations to combat cybercrimes, and formed computer emergency response teams and coordination centres. Many countries have adopted strategies without developing implementation mechanisms, and others have formed emergency response teams and adopted laws without developing a comprehensive national strategy.

Noteworthy developments over the past two years include the establishment of computer emergency response teams and coordination centres in Bahrain and Libya in 2013, and most recently in Kuwait and Palestine in 2015. Over the period 2014-2016, the national centre in Bahrain will provide its services exclusively to government and semi-government bodies, and will then play a coordination role with business and institutions.[1] The Libyan national centre benefited from collaboration with ITU during its establishment. Jordan and Lebanon are working on setting up similar computer emergency response teams and coordination centres, following a readiness evaluation by ITU.

1. Internet safety and security

Computer emergency response teams are a vital component of any cybersecurity strategy at the national and institutional levels. They must have specialized skills to improve the ability of relevant bodies in implementing laws and to protect persons and institutions from cyberthreats. Over the period 2003-2015, there was an increase in emergency response teams in the Arab region from one in Tunisia to 13 (table 5.1). Arab countries made huge strides in the field over that period by improving cybersecurity strategies, reforming cybercrime laws, securing electronic transactions, using

Table 5.1. National bodies responsible for information security and relevant initiatives in the Arab region, 2013

Country	National body responsible for cybersecurity	National computer emergency response teams, or equivalent, and website	National cybersecurity strategy or equivalent
Algeria	Ministry of Post, Information Technology and Communication	Non-existent	Cybersecurity bill (2008)
Bahrain	Telecommunications Regulatory Authority	Computer Emergency Response Team (2013)	National cybersecurity policy (in preparation)
Egypt	National Telecommunications Regulatory Authority and Supreme Council of Cybersecurity	Computer Emergency Response Team (EG-CERT) (2010) www.egcert.eg	National ICT strategy 2012-2017; establishment of the Supreme Council of Cybersecurity in 2015; implementation of the Amanak awareness-raising project
Iraq	-	-	-
Jordan	National Information Technology Centre	Under construction	National Information Assurance and Cyber Security Strategy (2012)
Kuwait	Central Agency for Information Technology	Computer Emergency Response Team (KW-CERT) (2015)	Cybersecurity strategy
Lebanon	Telecommunications Regulatory Authority and the Office of the Minister of State for Administrative Development Affairs	Computer Incident Response Team (LEBCIRT) (under construction)	E-government strategy, covering cybersecurity; and a text entitled "Guidelines for information security policies" which is currently being developed by the Office of the Minister of State for Administrative Development Affairs
Libya	Ministry of Communications and Information Technology	Computer Emergency Response Team (Libya-CERT) (2013) www.cim.gov.ly/page80.html	Initiative to raise awareness on cybersecurity
Morocco	General Directorate of Information Security Systems	Computer Emergency Response Team (ma-CERT) (2012) www.educert.ma	National ICT strategy framework; digital Morocco project (2013)
Oman	Information Technology Authority	Oman National Computer Emergency Readiness Team (OCERT) (2010) www.cert.gov.om	Cybersecurity strategy and action plan
Palestine	Ministry of Communications and Information Technology	Computer Emergency Response Team (PalCERT) (2015)	Information Security Policy
Qatar	Ministry of Communications and Information Technology	Qatar Computer Emergency Response Team (Q-CERT) (2005) www.qcert.org	National cybersecurity strategy, currently being revised by stakeholders
Saudi Arabia	Communications and Information Technology Commission	Computer Emergency Response Team (CERT-SA) (2006) www.cert.gov.sa	Establishment of a system to combat cybercrimes only
Sudan	National Telecommunication Corporation	Computer Emergency Response Team (Sudan-CERT) (2011) www.cert.sd	National cybersecurity strategy; information security project
Syrian Arab Republic	National Agency for Network Services	National Computer Emergency Response Team (SyCERT) (2011) www.nans.gov.sy/index.php/isecurity	National information security policy
Tunisia	National Agency for Computer Security	Tunisian Computer Emergency Response Team (tunCERT) (2003) www.ansi.tn/	National cybersecurity strategy, updated in 2014
United Arab Emirates	Telecommunications Regulatory Authority	Arab Emirates Computer Emergency Response Team (aeCERT) (2008) www.aecert.ae	Public telecommunications policy decision (No. 21 of 2013) that organizes information security in government institutions; awareness and cybersecurity initiative "Salem"; and IT Safety Act (2004)
Yemen	National Information Centre	-	Guidelines on cybersecurity

Source: ESCWA collected this information with reference to the following: websites contained in the table; 2015 national surveys; 2013 Regional Profile of the Information Society; ITU website; and other websites.
http://www.itu.int/en/ITU-D/Cybersecurity/Pages/About.aspx.
http://www.itu.int/dms_pub/itu-d/opb/str/D-STR-SECU-2015-PDF-E.pdf.

electronic signatures, promoting e-commerce, and increasingly resorting to emergency response teams.

These teams are tasked with protecting countries' critical infrastructure, and assist in detecting malware on computers and limiting their propagation. They also participate in training and raising awareness on cyberthreats. A 2012 Microsoft study, prepared under an initiative entitled "Trustworthy computing",[2] indicates that malware present a significant threat to the Arab region and the world, and that developing countries are subject to relatively higher numbers of malware attacks.

2. Privacy and data protection

Despite considerable progress in cyberlegislation in the region, including laws on cybercrimes, most Arab countries lack laws that protect personal data, excluding the United Arab Emirates that issued law No.1 of 2007, Tunisia that enacted law No. 63 of 2004 and Morocco that passed law No. 9 of 2009. Algeria, Jordan, Oman and the Syrian Arab Republic have taken legislative measures to protect personal data, such as preparing bills in that regard. Lebanon has issued a cyberspace bill that has a chapter dedicated to personal data.

Many Arab countries have taken procedural measures to ensure data privacy. For example, in Jordan, the department of IT crimes under the General Security participates in televised awareness-raising programmes and holds training sessions in schools to increase awareness of cybercrimes and to offer advice on protecting personal data in cyberspace. ESCWA has prepared a detailed analysis of such laws under its project on cyberlegislation, wherein it offered guidance on processing an protecting personal data.[3]

3. Combating ICT misuse

Arab countries began focusing on combatting cybercrime, especially preventing electronic attacks, because of increasing threats and ICT misuse. Several countries have made concerted efforts to enact and adopt cybercrime laws, or amend their penal codes to include provisions on cybercrimes. Demand for information security products has increased significantly in the region, where e-safety plans have been developed and computer emergency response teams have been formed. Many countries have recognized the importance of passing more cyberlegislation, and have reviewed current legislation and adopted cyberlaws.

With regard to national laws, in 2014, Bahrain issued law No. 60 on IT crimes, and Qatar passed a law on combating cybercrime. Concerning related bills, the National Assembly of Kuwait[4] submitted a bill on combating Internet crimes to the Government in 2015; and the Council of Representatives of Iraq has established three parliamentary committees to study a bill on IT crimes[5] to be passed in 2016. In Egypt, the Council of Ministers presented a cybercrime bill to the President in May 2015 (table 5.2).

At the regional level, the Arab Convention on Combating Information Technology Offences, adopted by the League of Arab States in 2010, sets out a framework for tackling key issues such as legally defining cybercrimes and identifying judicial priorities. A total of 18 Arab countries have signed the Convention, and seven have ratified it. ESCWA has prepared a set of directives on cybercrimes for the Arab region under its project to coordinate cyberlegislation, so as to promote the information society in the region, to standardize the concept of cybercrime, and to facilitate collaboration between Arab countries in combating cybercrime. A recent ESCWA study on strengthening cybersecurity in the Arab region[6] presents an integrated framework to combat cybercrime, which includes policy recommendations that cover legislative, procedural and institutional aspects and awareness-raising issues, and which

stresses the need for regional coordination and cooperation. The study also contains a model law that sets out procedural rules on cybercrime and digital evidence that Arab countries can refer to when formulating cyberlegislation.

ITU and the Government of Oman established the Regional Centre for Cybersecurity in the Arab Region in 2013, which offers services and initiatives for improving electronic security in the Arab region through improved regional coordination and cooperation.[7]

Important measures have been taken, at the regional and national levels, to protect children on the Internet, to increase awareness among parents, teachers and young people, and to analyse the legal and legislative aspects of protecting children on the Internet, so as to implement the necessary procedures accordingly. At the regional level, an annex to the Convention has been prepared on protecting children on the Internet. The ITU Regional Office has developed guidelines for the legal framework to protect children on the Internet in the Arab region, in collaboration with several Arab countries.[8]

4. Global cybersecurity

In 2014, ITU developed the Global Cybersecurity Index to measure national cybersecurity across the world. ITU has collaborated with ABI Research in developing the Index's methodology and calculation mechanism. The Index has five sub-indexes, namely legal procedures, technical procedures, institutional procedures, capacity-building and enterprise establishment, all of which are key elements for ensuring cybersecurity. According to the Index, Oman ranked first in

Table 5.2. Cybercrime laws in selected Arab countries

Country	Cybercrime law	Year of issue
Bahrain	Law No. 60 on Information Technology Crimes	2014
Egypt	Ministerial decree No. 327 on establishing a department to combat cybercrime	2002
Jordan	Law No. 30 on Information System Crimes	2010
Kuwait	Bill on Combating Internet Crimes	
Lebanon	Circular No. 4 on protecting IT software and combating piracy	2006
Morocco	Law No. 53-05 on the electronic exchange of legal data contains provisions on cybercrime	2007
Oman	Law on combating IT crimes, pursuant to royal decree No. 12/2012	2012
Palestine	Project to amend the penal code to include provisions on cybercrime	
Qatar	Law No. 14 on enacting a law to combat cybercrime	2014
Saudi Arabia	Establishment of a system to combat IT crimes pursuant to ministerial decision No. 79	2007
Sudan	Law No. 14 on combating IT crimes	2007
Syrian Arab Republic	Law No. 17 on regulating online communications and combating cybercrime	2012
Tunisia	The law on e-transactions and e-commerce contains provisions on cybercrime	2007
United Arab Emirates	Federal law be decree No. 5 of 2012 on combating Information Technology Crimes	2012
Yemen	Bill on combating cybercrime	

Source: https://www.unescwa.org/cyber-legislation.

the Arab region and third globally alongside Australia and Malaysia. Canada took second place and the United States of America was first. Oman ranked first in the region because of its developed national institutional structure, effective cyberspace laws and concerted national efforts to build capacity and strengthen national and regional cooperation.

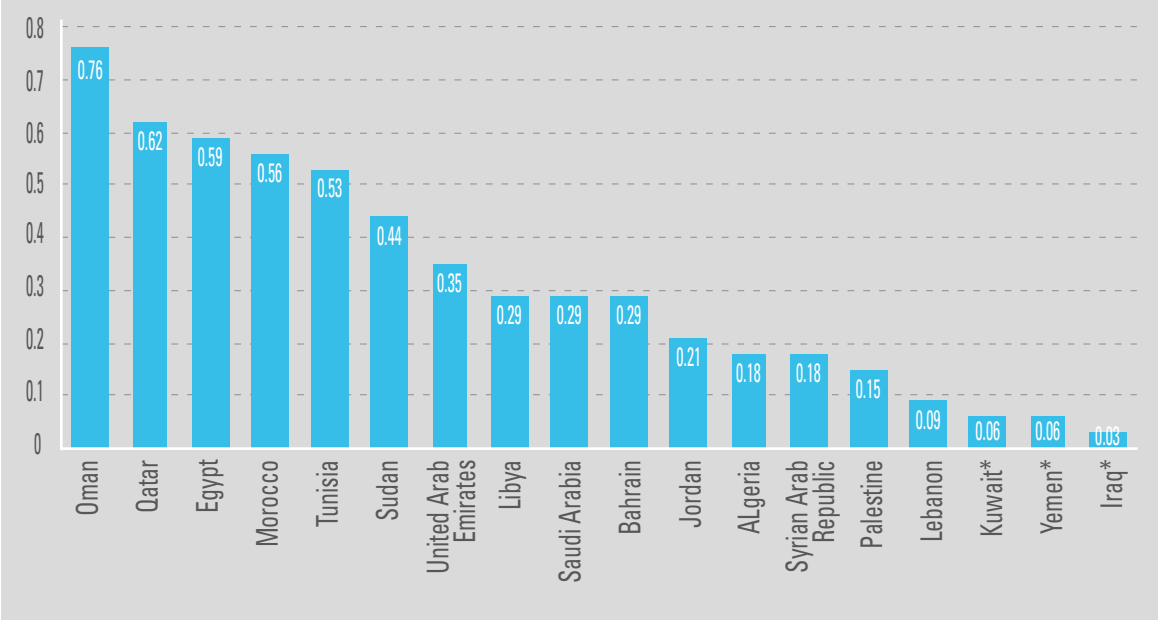
Oman is followed by Qatar, Egypt, Morocco and Tunisia, all with similar scores, and which ranked eighth, ninth, tenth and eleventh globally, respectively. However, sub-index scores for these Arab countries and others show variations in cybersecurity development. For example, Tunis ranked first among Arab countries in the legal procedures sub-index, given that it was the first country to enact cyberlegislation and combat cybercrime. With regard to the technical procedures sub-index, Qatar came first in the region; and Egypt came first in the capacity-building sub-index, reflecting national efforts to develop standards and improve human resources and accredited vocational training. Oman ranked highest in the institutional procedures and cooperation sub-indexes.

B. Building trust and ensuring security in ICT use: maturity levels and rankings of selected Arab countries

Over the past 10 years, most Arab countries have made significant progress in building trust and ensuring security in ICT use, especially in the legislative field. The formation of computer emergency response teams in several countries is a vital national and regional step. Arab countries can be divided into the following three categories (table 5.3), according to maturity levels in building trust and ensuring ICT use over the period 2003-2015:

Maturity level 1: countries with low maturity levels in legal and legislative frameworks that ensure cybersecurity and privacy

Figure 5.1. Global Cybersecurity Index in the Arab region, 2014



Source: ESCWA, based on data available from www.itu.int/en/ITU-D/Cybersecurity/Pages/GCI.aspx.
*Data from non-primary sources.

and prevent ICT misuse. Some of these countries have enacted laws and legislation, but practical application remains weak despite their importance in moving towards a more developed and mature environment.

Maturity level 2: countries that have passed basic laws to combat ICT misuse, and to ensure a secure environment for electronic transactions. These countries must adopt better mechanisms to monitor and combat cybercrime, and must focus on reinforcing privacy and data protection laws and on strengthening existing policies in the field.

Maturity level 3: countries that have a good legislative environment, efficient computer emergency response teams and the ability to respond to emerging cyberthreats. However, to improve their status, these countries must take procedural steps, raise awareness, offer training and collaborate at the regional and international levels.

C. Conclusion

The Arab region has many strengths and weaknesses in building trust and ensuring security in ICT use.

1. Strengths

- Formation of computer emergency response teams in most Arab countries, despite variations in their tasks and capacity to provide protection services; and establishment of a specialized regional centre
- Enactment of cyberlegislation in most

Table 5.3. Maturity levels in building trust and ensuring security in ICT in selected Arab countries

Country	2007	2009	2011	2013	2015
Bahrain	1	1	1	2	3
Egypt	2	2	2	2	2
Iraq	2	1	1	1	1
Jordan	1	1	1	1	2
Kuwait	2	1	1	1	1
Lebanon	1	1	1	1	1
Libya	-	-	-	1	1
Morocco	-	-	-	2	3
Oman	1	1	1	2	3
Palestine	1	1	1	1	1
Qatar	2	2	2	3	3
Saudi Arabia	2	2	2	3	3
Sudan	-	1	1	1	2
Syrian Arab Republic	1	1	1	1	2
Tunisia	-	-	-	3	3
United Arab Emirates	2	2	2	3	3
Yemen	1	1	1	1	1
Regional average	1.5	1.3	1.3	1.7	2.1

Source: ESCWA.
Note: Data do not cover Libya, Morocco and Tunisia before 2013, given that they joined ESCWA in 2012.

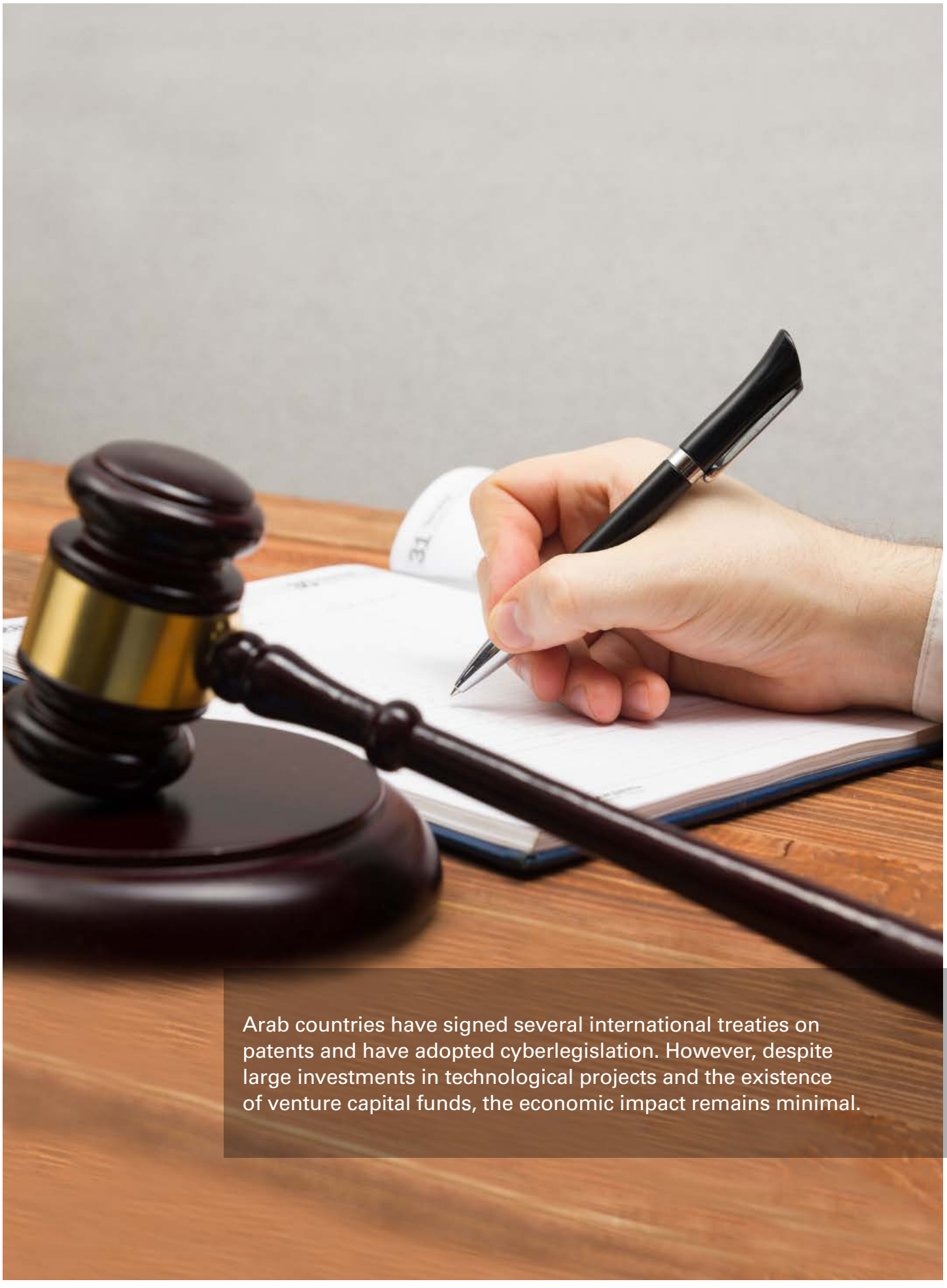
countries, despite variations in their methods for tackling cybercrime
- Adoption of the Arab Convention on Combating Information Technology Offences by the League of Arab States, and its signing by 18 Arab countries and ratification by seven countries
- Establishment of the regional cybersecurity centre for the Arab region, through collaboration between ITU and Oman

2. Weaknesses

- Existing national ICT strategies are fragmented and regionally uncoordinated
- Lack of laws on the protection and processing of personal data in most Arab countries
- Absence of a body responsible for cybersecurity in most countries; or lack of coordination between stakeholders
- Judicial bodies are unfamiliar with tackling cybercrime
- Lack of regional cooperation and information exchange between stakeholders, such as computer emergency response teams, to strengthen capacity to combat cybercrime

3. Recommendations

- Develop national security strategies for the ICT field, in collaboration with all stakeholders, and clear action plans to be implemented by a specific national body; and enact cyberlegislation in line with relevant international treaties on combating cybercrime and protecting privacy and personal data
- Put in place operational procedures and establish bodies to implement laws on building trust in cyberspace; and increase cooperation at the national, regional and international levels to combat cybercrime
- Develop a national cybersecurity culture by launching awareness-raising and training campaigns on Internet dangers, especially those that pose a threat to children, teenagers and women
- Build the capacity of policymakers, judges and organizational bodies to tackle all types of emerging cybercrime; and continually train technicians on technological developments and protection methods against IT threats and cyberattacks
- Exchange best practices learned from computer emergency response teams in Arab countries, so as to improve ICT accident management using modern technological solutions and standards.



Arab countries have signed several international treaties on patents and have adopted cyberlegislation. However, despite large investments in technological projects and the existence of venture capital funds, the economic impact remains minimal.

6. Enabling environment

Developing a flourishing information society requires an enabling and supportive environment that includes the necessary organizational and legal frameworks to facilitate the propagation of ICT and its applications, such as government assistance in launching start-ups, implementing development projects and promoting investment. According to the World Economic Forum (WEF), an enabling environment is analysed through three key pillars, namely the business environment, the political and regulatory environment, and infrastructure. The last pillar was removed from the environment sub-index in 2012, and became part of the readiness sub-index. Enabling environments vary between Arab countries: they are developed in GCC countries and Jordan, to a certain extent, whereas Egypt, Lebanon, Morocco, the Syrian Arab Republic and Tunisia struggle to maintain them given the political instability over the past few years. Algeria, Iraq, the Sudan and Yemen lack an enabling environment.

Table 6.1. Values and rankings of selected Arab countries according to the environment sub-indicator of the Network Readiness Index, 2007-2015

Country	2007		2009		2011		2012		2013		2014		2015	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	3.87	35	4.29	32	4.77	25	4.83	28	5.05	19	5.1	18	5.4	11
Qatar	3.72	44	4.41	29	4.73	26	5.1	15	5.19	14	5.23	13	5.3	15
Saudi Arabia	..	..	4.11	38	4.53	32	5	17	4.87	25	4.86	27	4.8	29
Jordan	3.53	52	3.94	48	4.04	49	4.16	48	4.35	42	4.45	41	4.5	38
Bahrain	3.3	65	4.12	37	4.59	30	4.84	27	4.83	28	4.52	40	4.5	40
Oman	..	..	3.84	51	4.17	43	4.63	36	4.61	37	4.69	33	4.5	43
Kuwait	3.71	45	4.02	44	3.99	52	3.99	56	3.9	69	3.85	78	3.9	69
Morocco	3.13	76	3.53	74	3.79	72	3.86	66	3.85	74	3.79	84	3.9	80
Tunisia	3.84	37	4.08	43	4.15	45	4.02	55	..	..	3.64	102	3.6	103
Lebanon	..	..	..	..	3.62	81	3.64	92	3.74	86	3.63	103	3.5	107
Syrian Arab Republic	..	..	3.18	101	3.09	121	3.33	115	..	..	..	..	..	..
Egypt	3.15	74	3.63	64	3.79	71	3.68	85	3.62	99	3.44	119	3.3	123
Libya	..	..	3.16	104	2.88	133	..	..	3.18	130	3.17	136	3	133
Algeria	3.94	92	2.93	120	3.05	125	2.83	136	2.6	143	2.76	143	3	134
Yemen	..	..	..	..	..	..	2.86	134	2.91	138	2.94	139	2.9	135
Regional average	3.58		3.79		3.94		4.06		4.05		4.01		4.01	

Source: WEF, Global Information Technology Reports, from 2007 to 2015.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.
Notes: Sub-index calculations changed radically after 2005, eliminating 2003 and 2005 from the measurement because of an inability to compare their values to those of other years. In 2012, the infrastructure pillar was removed from the environment sub-index.
(..) indicate that data are unavailable.

A. Achievements in ICT enabling environments

In general, over the period 2007-2015, most GCC countries achieved ICT enabling environments, despite setbacks in some. The United Arab Emirates was at the forefront of the Arab region according to the enabling environment sub-index, and came eleventh from 144 countries in 2015, compared with thirty-fifth in 2007. Qatar rose 29 places over the period 2007-2015, Kuwait fell 24 places in the same period, and Bahrain rose 12 places in the period 2013-2015. Jordan maintained first place among Mashreq countries over the period 2007-2015, rising from fifty-second to thirty-eighth place, as a result of government and business efforts to improve the organizational framework and promote innovation. Egypt and the Syrian Arab Republic fell in the rankings given their political instability, and Lebanon dropped 21 places over the period 2013-2015. In North Africa, Tunisia, which was at the forefront, fell from thirty-seventh place in 2007 to 103rd in 2015, possibly because of the political crisis that began in 2010.

1. Policy and regulatory environment

(a) National laws for the protection of intellectual property and related international treaties and systems

Protecting intellectual property, especially in programming, content and IT products, and the rights and privacy of consumers are two key aims of related laws. The main incentive to adopt such legislation was external rather than internal, resulting from commitments following accession to international treaties and organizations, such as the World Trade Organization (WTO) and the World Intellectual Property Organization (WIPO). Despite significant efforts by some Arab countries, the effects of intellectual property legislation have remained limited on certain practices such as software piracy, for example. Most countries have been unable to implement these legislation in practice through specialized judicial police, and piracy rates remain high despite broad partnerships between software companies (such as Cisco and Microsoft) and some Arab countries before 2003, especially Egypt, Jordan and the United Arab Emirates. The situation is similar with regard to protecting consumer privacy; despite the existence of some legislation on communication privacy (encryption and public key systems), for example, the implementation and scope of such legislation has remained weak.

A move towards a knowledge-based society, requiring software and content development and technological innovation, demands the formulation and application of international treaties on patents that enable Arab countries to effectively participate at the global level. Countries in the region have signed several such treaties (table 6.2), including the WTO Agreement on Trade-Related Aspects of International Property Rights (TRIPS) that many Arab countries have acceded to; others in the process of acceding have been awarded observer status. The Paris Convention for the Protection of Industrial Property is the most widely adopted treaty in the region, followed by the Patent Cooperation Treaty. Other agreements, especially the WIPO Copyright Treaty, the Madrid Agreement Concerning the International Registration of Marks and the Patent Law Treaty, have not been signed by many Arab countries. Recently, there has been no marked change in the status of intellectual property laws in the Arab region, other than the accession of Saudi Arabia to the Patent Law Treaty in 2013. Bahrain, Morocco and Oman are the most committed to international treaties, followed by Egypt, Qatar, Tunisia and the United Arab Emirates that have signed at least five of the eight relevant treaties.

(b) Software piracy

Software piracy is impeding the move towards a knowledge-based economy, given that it undermines efforts to develop software at the national and regional levels and, in turn,

Table 6.2. Accession of selected Arab countries to treaties on intellectual property

Country	WTO	Paris Convention	Patent Cooperation Treaty	WIPO Copyright Treaty	Madrid Agreement	Hague Agreement	Patent Law Treaty	TRIPS
Algeria	Observer	1966	2000	..	..	..	..	Observer
Bahrain	1995	1997	2007	2005	Protocol 2005	..	2005	1995
Egypt	1995	1951	2003	..	Agreement 1952	1952	..	1995
Iraq	Observer	1976	..	..	..	..	..	Observer
Jordan	2000	1972	..	2004	..	..	..	2000
Kuwait	1995	..	..	..	..	..	..	1995
Lebanon	Observer	1924	..	..	..	..	..	Observer
Libya	Observer	1976	2005	..	..	..	..	Observer
Morocco	1995	1917	1999	2011	Agreement 1917	1930	..	1995
Oman	2000	1999	2001	2005	Protocol 2007	2009	2007	2000
Palestine	..	..	..	..	..	..	..	..
Qatar	1996	2000	2011	2005	..	..	..	1996
Saudi Arabia	2005	2004	..	..	..	..	2013	2005
Sudan	Observer	1984	1984	..	Agreement 1984	..	..	Observer
Syrian Arab Republic	Observer	1924	2003	..	Agreement and Protocol 2004	2008	..	Observer
Tunisia	1995	1884	2001	..	..	1930	..	1995
United Arab Emirates	1996	1996	1999	2004	..	..	..	1996
Yemen	Observer	2007	..	..	..	..	..	Observer

Source: www.wipo.int.
Note: (..) indicate that data are unavailable.

weakens its potential contribution to achieving economic development. According to a 2014 study by the Software Alliance, software piracy rates reached 43 per cent in 2013, averaging $62.7 billion.[1]

Table 6.3 shows significant reductions in software piracy over the period 2003-2013 in Bahrain, Egypt, Jordan, Kuwait and Qatar, which increased efforts to combat the phenomenon and to raise awareness of its repercussions. The table also indicates that the highest piracy levels (over 80 per cent) are recorded in Algeria, Iraq, Libya and Yemen, followed by Lebanon and Tunisia (70-79 per cent), Egypt and Morocco (60-69 per cent), and Bahrain, Jordan, Kuwait and Saudi Arabia (50-59 per cent). The United Arab Emirates has the lowest levels, despite slight increases, at 37 per cent for the period 2003-2013.

Although piracy rates have dropped in most Arab countries, the commercial value of unlicensed software has increased, resulting in an estimated $3.59 billion of losses in 2013. This increase is mainly attributed to larger software markets in the region, noting that the commercial value of unlicensed software in

Table 6.3. Software piracy rates and unlicensed software commercial value in selected Arab countries

Country	Pirated software (%)						Commercial value of unlicensed software (millions of dollars)					
	2003	2005	2007	2009	2011	2013	2003	2005	2007	2009	2011	2013
Algeria	84	83	84	84	84	85	59	66	86	55	83	102
Bahrain	64	60	57	54	54	53	18	22	27	21	23	27
Egypt	69	64	60	59	61	62	56	80	131	146	172	198
Iraq	..	..	85	85	86	86	..	..	124	129	172	116
Jordan	65	63	60	57	58	57	15	19	20	26	31	35
Kuwait	68	66	62	60	59	58	41	65	61	62	72	97
Lebanon	74	73	73	72	71	71	22	34	44	46	52	65
Libya	..	..	88	88	90	89	..	..	22	25	60	50
Morocco	73	68	67	66	66	66	57	55	66	64	91	69
Oman	65	63	61	63	61	60	11	22	23	39	36	65
Qatar	63	60	54	51	50	49	13	21	25	50	62	77
Saudi Arabia	54	52	51	51	51	50	120	178	170	304	449	429
Tunisia	..	..	76	72	74	75	..	..	54	44	51	66
United Arab Emirates	34	34	35	36	37	36	29	45	94	155	208	230
Yemen	29	54	89	90	89	87	82	81	13	10	15	9
Regional average	61.8	61.7	66.8	65.9	66.1	65.6	43.6	57.3	64.0	78.4	105.1	109.0
Global average	36	34	38	41	42	43						

Source: www.bsa.org/~/media/Files/Research%20Papers/GlobalStudy/2014/2013GlobalSurvey_Study_en.pdf.

selected countries makes up only 2.48 per cent of the global software market.

(c) Cyberlegislation

Cyberlegislation plays a key role in building an information society and knowledge-based economy, given that it regulates e-transactions including administrative and commercial relations between the public sector and private institutions, on the one hand, and between citizens and all institutions, on the other. Such legislation protects individuals and organizations from cyberspace misuse, private data theft and human rights violations.

Table 6.4 shows Arab countries' progress in developing cyberlegislation on e-signatures, e-transactions and e-commerce. Over the past two years, e-transaction laws have been passed in Kuwait, Palestine and the Syrian Arab Republic, but Algeria, Egypt and Lebanon have not yet adopted any legislation.

Despite the region's notable progress in developing cyberlegislation, including laws on cybercrime (table 5.2), most Arab countries lack personal data protection laws, excluding the United Arab Emirates (law No.1 of 2007), Tunisia (law No. 63 of 2004) and Morocco (law No. 9 of 2009).[2] Regarding personal data protection laws, bills have been passed in several countries, including Algeria, Jordan, Oman and the Syrian Arab Republic. In Lebanon, the cyberspace bill contains a chapter on protecting personal data.

Table 6.4. Laws on e-signatures, e-transactions and e-commerce in selected Arab countries

Country	E-signature	E-transactions	E-commerce
Algeria	Law 4/2015	Bill	Bill
Bahrain	Law 28/2002	Law 28/2002	Law 28/2002
Egypt	Law 15/2004	Bill	Bill
Iraq	Law of 2011	Law of 2011	Law of 2011
Jordan	Law 85/2001	Law 85/2001	..
Kuwait	Law 20/2014	Law 20/2014	..
Lebanon	Bill	Bill	Bill
Libya	..	..	..
Morocco	Law 05-53/2007	Law 05-53/2007	Law 05-53/2007
Oman	Law 69/2008	Law 69/2008	..
Palestine	Bill	Bill	..
Qatar	Law 16/2010	Law 16/2010	Law 16/2010
Saudi Arabia	Law 18/2007	Law 18/2007	..
Sudan	Law of 2007	Law of 2007	Law of 2007
Syrian Arab Republic	Law 4/2009	Law 3/2014	Law 3/2014
Tunisia	Law 83/2000	Law 83/2000	Law 83/2000
United Arab Emirates	Law 1/2006	Law 1/2006	Law 1/2006
Yemen	Law on e-payment only 40/2006	Law on e-payment only 40/2006	..

Source: Reports on the ESCWA cyberlegislation project, available from http://isper.escwa.un.org/FocusAreas/CyberLegislation/Projects/tabid/161/language/en-US/Default.aspx; Kuwait data available from www.gcc-legal.org/LawAsPDF.aspx?opt&country=0&LawID=4094.
Note: (..) indicate that data are unavailable.

2. Innovation-enabling business environments

Innovation-enabling business environments cover ICT investment and government procedures that support and stimulate innovation.

(a) Venture capital funds

Venture capital promotes innovation and strengthens entrepreneurship among young people, especially in the ICT field where innovators compete to develop and market new products. However, many Arab countries still lack such facilities despite their success in most GCC countries, according to a survey carried out by the World Economic Forum between 2007 and 2015 (table 6.5).

GCC countries, excluding Kuwait and led by Qatar, are at the forefront of Arab countries in the availability of venture capital. Kuwait, Libya and Tunisia have lower levels, followed by Morocco. Countries with the least amount are Algeria, Egypt, the Syrian Arab Republic and Yemen. Most GCC countries, Egypt, Jordan and Morocco made considerable progress in this field over the period 2007-2013. Lebanon and Libya made insignificant progress in the index values and rankings, while Algeria, Kuwait, the Syrian Arab Republic and Tunisia have recorded a drop in both. From 2014 to 2015, some Arab countries, including Algeria, Kuwait, Morocco and Lebanon, made small advances in the provision of venture capital. Slight drops were recorded for Bahrain, Oman and Saudi

Table 6.5. Index on the availability of venture capital in selected Arab countries, 2007-2015

Country	2007		2009		2011		2012		2013		2014		2015	
	Value*	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
Qatar	3.8	37	4.1	24	4.1	6	5.4	1	4.7	1	4.5	2	4.8	1
United Arab Emirates	4.7	17	4.3	17	3.7	16	4	13	4.1	8	4.1	10	4.4	4
Bahrain	3.3	56	4	26	3.7	18	4.2	8	4.3	7	3.8	15	3.6	18
Oman	..	..	4.1	22	3.8	15	3.9	16	3.8	14	3.9	14	3.5	21
Jordan	3.1	70	3.3	51	2.7	54	2.7	62	2.9	48	3	45	3.5	23
Saudi Arabia	..	..	3.7	38	3.8	14	4.2	7	3.7	18	3.4	25	3.4	27
Morocco	2.7	92	3	67	3	40	3.3	30	3	38	2.8	56	2.9	49
Lebanon	..	..	..	..	2.5	67	2.7	60	2.7	63	2.7	62	2.8	59
Tunisia	4.1	31	3.8	35	3.5	21	3.15	35			3	44	2.7	68
Kuwait	4.2	27	3.8	36	3.4	22	3.4	25	3	41	2.6	71	2.7	69
Egypt	2.8	87	3.4	46	3	41	3	41	3	40	2.9	51	2.3	103
Algeria	2.2	114	2.2	118	2.4	81	2.1	110	1.8	138	2	123	2.2	108
Syrian Arab Republic	..	..	2.5	103	2.1	113	2.1	107	..	..	..	..	..	..
Yemen	..	..	..	..	..	..	2.6	67	2.3	98	1.9	134	1.7	139
Libya	..	..	2.3	115	2.7	55	..	..	2.3	93	2	128	1.6	142
Regional average	3.43		3.42		3.17		3.34		3.20		3.04		3.01	
Global average	3.4		3.16		2.67		2.7		2.7		2.7		2.8	

Source: WEF, Global Information Technology Report, 2007-2015.
http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.
Note: (..) indicate that data are unavailable.
* "Value" indicates the value of the index on the availability of venture capital in a country, ranging between 1 and 7.

Arabia compared with a significant fall in Egypt and Tunisia.

Table 6.6 contains the values and rankings of selected Arab countries according to surveys conducted by WEF over the period 2007-2015. It shows that the status of foreign direct investment in Arab countries is similar to that of venture capital. GCC countries surpass the rest in this area, while Algeria, Egypt, Kuwait Libya and Morocco have regressed. However, foreign direct investment and technology transfer improved in Egypt and Morocco over the period 2014-2015 compared with 2012-2013, while Lebanon and Tunisia have fallen significantly in the global rankings mainly because of political instability and a lack of security.

(b) Entrepreneurship, innovation and incubators

Undoubtedly, innovation in Arab countries regressed over the period 2007-2014, despite significant investment in ICT projects and the presence of venture capital funds, especially in GCC countries. No Arab country ranked in the top 30 positions of the Global Innovation Index (table 6.7). Consequently, the enabling system for innovation and entrepreneurship in the region requires particular attention from Governments, investors and policymakers in the private sector. Arab countries must also review strategies and policies on promoting innovation, generating and propagating knowledge, and strengthening creativity in goods and service development and in selecting Internet content.

Table 6.6. Values and rankings of selected Arab countries in the index on foreign direct investment and technology transfer

Country	2007		2009		2011		2012		2013		2014		2015	
	Value*	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	5.6	15	5.5	15	5.7	6	5.5	10	5.7	6	5.9	2	5.8	3
Qatar	5.7	11	5.6	11	6	2	6.1	2	6.1	2	5.8	4	5.6	6
Saudi Arabia	..	..	5.2	40	5.5	9	5.5	8	5.5	8	5.5	8	5.4	10
Bahrain	4.9	68	5.2	34	5.4	11	5.3	18	5.5	11	5.3	10	5	30
Jordan	4.9	63	5.1	56	5	36	4.9	51	5	39	5.1	28	5	33
Morocco	5.2	43	4.8	72	5	35	4.9	54	4.9	46	4.7	61	4.8	45
Oman	..	..	4.7	78	4.9	52	4.9	46	4.9	45	4.9	48	4.8	52
Tunisia	5.3	34	5.3	27	5.3	13	5.2	25	..	..	4.6	70	4.4	84
Egypt	5.1	50	5.1	55	4.9	53	4.7	67	4.6	75	4.2	100	4.4	85
Syrian Arab Republic	..	..	4.2	110	3.8	121	4.1	106	..	..	..	..	..	..
Algeria	4.2	110	3.6	132	3.6	129	3.8	123	3.4	140	3.6	128	3.9	115
Yemen	..	..	..	..	..	..	2.7	142	3.2	144	3.5	140	3.4	136
Lebanon	..	..	..	..	3.9	117	4	112	3.9	117	3.6	129	3.4	139
Kuwait	3.9	119	4.2	106	3.4	134	3.4	135	3.3	142	3.2	144	3.2	141
Libya	..	..	4.2	105	3.7	127	..	..	3.6	136	3	148	2.7	144
Regional average	4.98		4.82		4.72		4.64		4.58		4.49		4.41	
Global average	4.9		4.8		4.6		4.6		4.6		4.5		4.5	

Source: http://reports.weforum.org/global-information-technology-report-2015/preface-espen-barth-eide-world-economic-forum.
Note: (..) indicate that data are unavailable.
* "Value" indicates the value of the index on the intersection between foreign direct investment and technology transfer in a country, ranging between 1 and 7.

The Global Innovation Index shows that most Arab countries perform weakly compared with others with similar GDP. This can be explained in GCC countries by 'the paradox of plenty': resource extraction activities divert investments from other productive sectors and impede innovation. GCC country performance is expected to improve in the coming years, especially given that most have begun to vary their activities and promote innovative sectors. To develop innovative capacity, middle-income countries, such as Algeria, Egypt and Lebanon, must adopt knowledge-based strategies to promote innovation and creativity, under a supportive enabling system.[3]

Technology parks and incubators are key methods for stimulating innovation and supporting electronic creativity (box 6.1).

B. Maturity levels of enabling environments in Arab countries

Selected Arab countries can be divided into the following four categories (table 6.8), according to maturity levels of enabling environments over the period 2003-2015:

Maturity level 1: countries that lack organizational and legal frameworks

Table 6.7. Global Innovation Index in selected Arab countries, 2007-2014

Country	2007		2009		2011		2012		2013		2014	
	Value*	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	3.81	14	3.99	26	41.99	34	44.4	37	41.87	38	43.25	36
Saudi Arabia	..	..	3.65	32	36.44	54	39.3	48	45.89	44	41.61	38
Qatar	..	..	4.12	24	47.74	26	45.5	33	41	43	40.31	47
Jordan	2.61	53	3.16	55	38.43	41	37.1	56	37.3	61	36.21	64
Bahrain	..	..	3.59	34	37.8	46	41.1	41	36.13	67	36.26	62
Kuwait	3.14	30	3.66	30	36.64	52	37.2	55	40.02	50	35.19	69
Oman	..	..	3.23	52	35.51	57	39.5	47	33.25	80	33.87	75
Lebanon	..	..	..	..	37.11	49	36.2	61	35.47	75	33.6	77
Tunisia	2.84	41	3.37	46	33.89	66	36.5	59	35.82	70	32.94	78
Morocco	2.23	76	2.76	82	28.73	94	30.7	88	30.89	92	32.24	84
Egypt	2.24	74	2.83	76	29.21	87	27.9	103	28.48	108	30.03	99
Algeria	2.11	83	2.29	108	19.79	125	24.4	124	23.11	138	24.2	133
Syrian Arab Republic	..	..	2.55	94	24.82	115	23.1	132	23.73	134	..	..
Yemen	..	..	..	..	20.72	123	19.2	139	19.32	142	19.53	141
Sudan	..	..	..	..	20.36	124	16.8	141	19.81	141	12.66	143
Libya	..	..	2.13	119	..	..	..	..	..	..	..	..
Regional average	2.71		3.18		32.61		33.26		32.81		32.28	

Source: European Institute for Business Administration (INSEAD) and World Intellectual Property Organization (WIPO) (2013), Global Innovation Index 2007-2014. www.globalinnovationindex.org/content/page/GII-Home.
Note: (..) indicate that data are unavailable.
* "Value" indicates the value of the Global innovation Index, ranging between 0 and 7 for 2007 and 2009, and between 0 and 100 for 2011, 2012, 2013 and 2014.

supporting the ICT sector and meeting consumer needs; where law application is weak resulting in increased software piracy; and with limited funds for investment and entrepreneurship.

Maturity level 2: countries with medium levels of progress towards necessary political and regulatory frameworks and an innovative business environment. Despite some countries acceding to international treaties on intellectual property rights and patents, laws regulating cyberspace remain limited, and measures to promote investment and develop an environment conducive to innovation are weak.

Maturity level 3: countries that have a good political and regulatory environment supporting businesses, and that have signed several international treaties on intellectual property rights and patents and have adopted cyberlaws that

Box 6.1. Tools to support entrepreneurship and innovation

ICT incubators are a key method for establishing an appropriate environment for innovation and entrepreneurship. Over the past years, other methods tools and mechanisms have emerged, such as contributions from the private and public sectors and non-profit organizations. Jordan and Lebanon, in particular, have witnessed a flurry in the establishment of support centres and institutions for entrepreneurship and innovations, such as technology incubators, business accelerators, co-working spaces and investor networks.

For example, Berytech was established in Lebanon in 2001 as the first body to provide services in entrepreneurship, technological innovation, guidance and matching commercial projects to research and development. The centre also provides networking platforms for investors, investment in pilot projects, cooperation between supportive regional and international organizations, and the launch of periodic specialized programmes. Also in Lebanon, AltCity was established as a co-working space, in addition to the 'Bader' programme for young entrepreneurs; Beirut Digital District and the Cloud 5 technology park. Other initiatives include, funding programmes such as 'Kafalat', decree No. 331 of the Central Bank, investor networks such as Middle East Venture Partners, and entrepreneur portals such as 'Wamda'.
In Jordan, the Queen Rania Centre for Entrepreneurship of the Princess Sumaya University for Technology has been working on building a national entrepreneurship system since 2004, through networking, awareness-raising, support and funding. Incubators have also been developed to enhance entrepreneurs' role, notably Oasis500, iPark and Al Urdonia Lil Ebda; as well as entrepreneur support organization such as the Business Development Centre, and investor networks including N2V.

In Egypt and the United Arab Emirates, an organization is being developed to support entrepreneurship and investment in innovation. In Oman, the Government has established Knowledge Oasis Muscat and two centres to stimulate innovation in the ICT sector, namely the Industrial Innovation Centre and the Sanad programme for self-employment and independent national development. The Knowledge Oasis aims to propagate a culture of research and innovation in all industrial sectors in Oman and to build capacity by covering new scientific and technological skills, and Sanad provides employment opportunities and lucrative projects for young Omanis by informing them of ICT services offered by the Government and companies. A list of various initiatives that support entrepreneurship in other Arab countries is available from https://en.wikipedia.org/wiki/List_of_Arab_entrepreneurship_initiatives.

Source: ESCWA.

cover e-transactions, e-commerce and cybercrime. They are able to advance their ICT sector through foreign direct investment and venture capital.

Maturity level 4: countries with an excellent enabling environment and legal framework for ICT. They have signed most international treaties on intellectual property rights and patents, and are characterized by low levels of software piracy. Their laws cover e-signatures, e-transactions and cybercrime, and they are taking measures to increase investment in the ICT sector.

C. Conclusion

Enabling environments in the Arab region have several strengths and weaknesses.

1. Strengths

- Most Arab countries, especially GCC

Table 6.8. Maturity levels of enabling environments in selected Arab countries, 2003-2015

Country	2003	2005	2007	2009	2011	2013	2015
Bahrain	2	3	3	3	3	3	3
Egypt	2	2	3	3	3	2	2
Iraq	1	1	1	1	1	1	1
Jordan	3	3	3	3	3	3	3
Kuwait	2	2	2	2	2	2	3
Lebanon	2	2	2	2	2	2	2
Libya	-	-	-	-	-	1	1
Morocco	-	-	-	-	-	2	3
Oman	2	2	2	2	3	3	3
Palestine	1	1	1	1	1	1	1
Qatar	2	2	2	3	4	4	4
Saudi Arabia	1	2	2	3	3	3	4
Sudan	-	-	-	1	2	1	1
Syrian Arab Republic	1	1	1	2	2	2	1
Tunisia	-	-	-	-	-	3	2
United Arab Emirates	3	3	3	4	4	4	4
Yemen	1	1	1	1	1	1	1
Regional average	1.8	1.9	2.0	2.2	2.4	2.2	2.3

Source: ESCWA.
Note: Data do not cover Libya, Morocco and Tunisia before 2013, given that they joined ESCWA in 2012.

countries, have adopted international treaties and protocols on intellectual property rights
- Most countries in the region have passed cyberlegislation on e-signatures, e-transactions and e-commerce.

2. Weaknesses

- Mechanisms for applying international treaties on intellectual property rights remain weak in most countries
- Software piracy is widespread in the region, with no effective means to combat it
- Most countries lack the necessary facilities to increase venture capital and secure foreign direct investment, despite their presence in GCC countries
- Innovation and entrepreneurship systems are weak in the region.

3. Recommendations

- Comply with international treaties on intellectual property rights and cyberlegislation, and ratify those that are consistent with national laws
- Put in place procedures to combat software piracy, urge the correct and efficient use of licensed software, and promote software development at the national and regional levels
- Enact and review cyberlegislation covering

all matters related to cyberspace and its applications, especially cyberlaws on the protection of personal data and the consumer and on e-payments
- Promote ICT investment and establish venture capital funds to support ICT startups
- Strengthen innovation and entrepreneurship in the ICT sector by establishing technology incubators and parks and links between research and development institutions and the business sector
- Include the private sector in efforts and initiatives to strengthen enabling environments.

Throughout the region, there are disparities in the availability of technological services. To bridge this gap, Arab countries must ensure cooperation, coordination and integration in the provision of such services.

7. ICT applications

ICT has numerous and varied applications that can be used to tackle economic and social issues, notably government applications including government services; business and trade; education; health; employment; and recruitment. The present chapter discusses such applications for government, trade and business. Previous issues of the present report have tackled health, education and recruitment applications.

A. ICT in government applications

In the mid-1990s, North American and European countries began using computers to improve the performance of public institutions. In the Arab region, such efforts began at the end of the 1990s, when most countries developed e-government strategies and plans, which they have continually reviewed over the years. However, in past few years, many of these projects have faced difficulties because of instability in many countries, resulting in service disruptions and a lack of data to monitor the performance of e-government services.

1. ICT in public administrations and government services

At the start of the twenty-first century, all Arab countries had begun launching programmes and projects to introduce ICT into public administrations, with varying success. GCC countries were at the forefront of these efforts. For example, Qatar implemented several initiatives aimed at providing e-government services, and earmarked large budgets for that purpose ($9.7 billion for the period 2010-2011). The United Arab Emirates developed Tashil to facilitate paperless government and financial transactions. Bahrain, Kuwait, Oman and Saudi Arabia launched similar services. Moreover, Egypt implemented several initiatives, including automating notary public work and land registration, with special focus on information processing and exchange between government departments. Lebanon developed e-tax services, and the Syrian Arab Republic automated its civil registry, which can be searched using national identification numbers.

Arab countries have adopted different approaches for overseeing e-government services. Some have entrusted the task to councils under the Council of Ministers (Bahrain and Qatar), others to the Ministry of Communications and Information Technology (Sudan and Yemen), to an administrative development department (Egypt and Lebanon) or to the Ministry of Finance (United Arab Emirates). Kuwait and Oman have granted the responsibility to specialized bodies, and the Syrian Arab Republic has developed various measures based on participatory responsibility. In Saudi Arabia, e-government is mostly supervised by the Ministry; however, other ministries and authorities are also involved.

By 2010, all Arab countries, excluding Libya, had designed and operationalized Internet portals for e-government services, with significant variations in size and scope. Some countries took into account ICT developments, such as social networks and smart phones, when designing these portals. Table 7.1 analyses e-government portals in selected Arab countries.

2. Developments in e-government and in the provision of Internet services

Given the absence of a standardized measurement to assess e-government

Table 7.1. Evaluation of e-government portals in selected Arab countries, 2011

Country	Website	Information			Services						Citizen participation			Additional services		
		General information	Laws	Directories	Downloadable forms	Interactive services	Bill e-payment	User accounts	Two languages	Mobile version	Social networks	Blogs	Polls	RSS	Site statistics	Search box
Bahrain	www.bahrain.bh	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Egypt	www.egypt.gov.eg	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓	✓	×	×	✓
Iraq	www.egov.most.gov.iq	✓	✓	✓	×	×	×	✓	✓	×	×	✓	✓	×	×	✓
Jordan	www.jordan.gov.jo	✓	✓	✓	✓	✓	×	×	✓	✓	×	×	×	×	×	✓
Kuwait	www.e.gov.kw	✓	✓	✓	✓	✓	✓	×	✓	×	×	×	✓	✓	×	✓
Lebanon	www.informs.gov.lb	✓	×	✓	✓	×	×	×	✓[1]	×	×	×	×	×	×	✓
Oman	www.oman.om	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	✓
Palestine	eportal.gov.ps	✓	✓	✓	✓	×	×	×	×	×	×	×	×	×	×	✓
Qatar	www.gov.qa	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	×	✓
Saudi Arabia	www.saudi.gov.sa	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓	✓	×	✓	✓
Sudan	www.sudan.sd	✓	×	✓	×	×	×	×	✓	×	✓	×	×	✓	×	✓
Syrian Arab Republic	www.egov.sy	✓	✓	✓	×	×	✓	×	×	×	×	×	×	×	×	×
United Arab Emirates	www.government.ae	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	×	✓
Yemen	www.yemen.gov.ye	✓	×	✓	✓	×	✓	✓	×	×	×	×	×	×	×	✓

Source: ESCWA, Regional Profile of the Information Society in Western Asia, 2011(E/ESCWA/ICTD/2011/4).
[a] The portal for Lebanon is in three languages: English, Arabic and French.

services in the region, e-government surveys conducted by the United Nations and its E-Government Development Index,[1] which replaced the E-Government Readiness Index, can be used as alternatives. The E-Government Development Index (EGDI) is the average of three sub-indexes that measure the scope and quality of Internet services, the development of telecommunications infrastructure, and the related human capital.

Table 7.2 sets out the values of the new E-Government Development Index and the old E-Government Readiness Index for Arab countries. Over the period 2010-2014, the largest improvement in e-government development was recorded in Morocco, which went from 126th place to 82nd place. A competitive ICT sector, a strong national ICT vision, government efforts to establish an open government data portal and the availability of e-participation tools have contributed to this progress. Moroccan e-participation tools allow access to legislative texts where citizens can make comments that the Government can then respond to, thus promoting interaction between the Government and citizens. Morocco is followed by Oman in the rankings, which went from eighty-second to forty-eighth place; Saudi Arabia from fifty-eighth to thirty-sixth place; and

Table 7.2. E-Government Development Index in selected Arab countries, 2003-2014

Country	E-Government Index																				
	2003			2004			2005			2008			2010			2012			2014		
	Value	Ranking	Difference	Value	Ranking	Difference	Value	Ranking	Difference	Value	Ranking	Difference	Value	Ranking	Difference	Value	Ranking	Difference	Value	Ranking	Difference
Algeria	0.370	91	-	0.325	118	-27	0.324	123	-5	0.352	121	2	0.318	131	-	0.361	132	-1	0.311	136	-4
Bahrain	0.510	46	-	0.532	46	0	0.528	53	-7	0.572	42	11	0.736	13	-	0.695	36	-23	0.809	18	18
Egypt	0.238	140	-	0.265	136	4	0.379	99	37	0.477	79	20	0.452	86	-	0.461	107	-21	0.513	80	27
Iraq	..	..	-	0.357	103		0.333	118	-15	0.269	151	-33	0.300	136	-	0.341	137	-1	0.314	134	3
Jordan	0.429	63	-	0.435	68	-5	0.464	68	0	0.548	50	18	0.528	51	-	0.488	98	-47	0.517	79	19
Kuwait	0.370	90	-	0.365	100	-10	0.443	75	25	0.520	57	18	0.529	50	-	0.596	63	-13	0.627	49	14
Lebanon	0.424	69	-	0.416	74	-5	0.456	71	3	0.484	74	-3	0.439	93	-	0.514	87	6	0.498	89	-2
Libya	..	146	-	..	..	..	..	..	..	0.355	120	-120	0.380	114	-	..	..	..	0.375	121	-
Morocco	0.265	131	-	0.264	138	-7	0.277	138	0	0.294	140	-2	0.329	126	-	0.403	120	6	0.506	82	38
Oman	0.355	98	-	0.288	127	-29	0.341	112	15	0.469	84	28	0.458	82	-	0.594	64	18	0.627	48	16
Qatar	0.411	77	-	0.401	80	-3	0.490	62	18	0.531	53	9	0.493	62	-	0.641	48	14	0.636	44	4
Saudi Arabia	0.338	105	-	0.386	90	15	0.411	80	10	0.494	70	10	0.514	58	-	0.666	41	17	0.690	36	5
Sudan	0.206	146	-	0.231	147	-1	0.237	150	-3	0.219	161	-11	0.254	154	-	0.261	165	-11	0.261	154	11
Syrian Arab Republic	0.264	133	-	0.264	137	-4	0.287	132	5	0.361	119	13	0.310	133	-	0.371	128	5	0.313	135	-7
Tunisia	0.329	108	-	0.323	120	-12	0.331	121	-1	0.346	124	-3	0.483	66	-	0.483	103	-37	0.539	75	28
United Arab Emirates	0.535	38	-	0.476	60	-22	0.572	42	18	0.630	32	10	0.535	49	-	0.734	28	21	0.714	32	-4
Yemen	0.188	151	-	0.195	154	-3	0.213	154	0	0.214	164	-10	0.215	164	-	0.247	167	-3	0.272	150	17
Regional average	0.35			0.35			0.38			0.42			0.43			0.49			0.50		
Global average				0.4127			0.4267			0.4514			0.4406			0.4882			0.471		

Source: ESCWA, based on www.un.org/en/development/desa/publications/connecting-governments-to-citizens.html.

Qatar from sixty-second to forty-fourth place. These changes are the result of amendments to the standards and measurements of the e-government service development index.

Bahrain and Jordan dropped in the Index and rankings, while Algeria, Libya, the Syrian Arab Republic and Tunisia only fell in the rankings. This regression can be partially credited to political instability, weak technical skills and a lack of funds allocated to government institutions tasked with developing computer applications for Internet services. The average value of the E-Government Development Index for GCC countries for 2012 exceeded that of 2010 by 20 per cent and the global average by 34 per cent. The main challenge for countries that recorded low Index values, including Algeria, the Sudan and Yemen, is weak ICT infrastructure.

The Index average for non-GCC countries in 2012 was 8.4 per cent higher than in 2010, and lower than the global average by 19.1 per cent. Lebanon ranked first among Mashreq countries, coming in eighty-seventh place; and Tunisia was at the forefront of Maghreb countries. In general, the Arab region recorded a 15 per cent improvement in its Index value, surpassing the global average by 0.8 per cent although it was 2.9 per cent below the global average in 2010.

In the 2014 E-Government Development Index, GCC countries remained ahead of other Arab countries,[2] because of strong ICT infrastructure and the availability of various Internet services that fully met citizens' needs. GCC countries also witnessed improvements in the Index compared with other Arab countries over the period 2010-2014, except the United Arab Emirates that dropped four places. Bahrain is the only Arab country that ranked among the top 20 countries globally.

Since 2010, the first sub-index has divided the implementation rates of e-government services into the following four stages: emerging services (first stage), enhanced services (second stage), transactional services (third stage) and connected services (fourth stage).[3] The old E-Government Readiness Index measured implementation in accordance with five stages, namely emerging services (stage one), enhanced services (stage two), interactive services (stage three), transactional services (stage four) and networked services (stage five).

Table 7.3 sets out the implementation rates of e-government services in Arab countries, according to the old and new indexes. It indicates that most countries have recorded significant improvements. The United Arab Emirates has improved the most, from 20 per cent in 2010 to 75 per cent in 2012, thus joining Bahrain in top position among ESCWA member States. In 2012, most Arab countries came at the top of the list for stage one, scoring 100 per cent. This rate dropped in 2014 when the survey was amended following a review of e-government concepts, focusing on new developments such as the 'whole-of-government' concept, open government, e-participation, e-environment, and services for vulnerable and marginalized social groups.

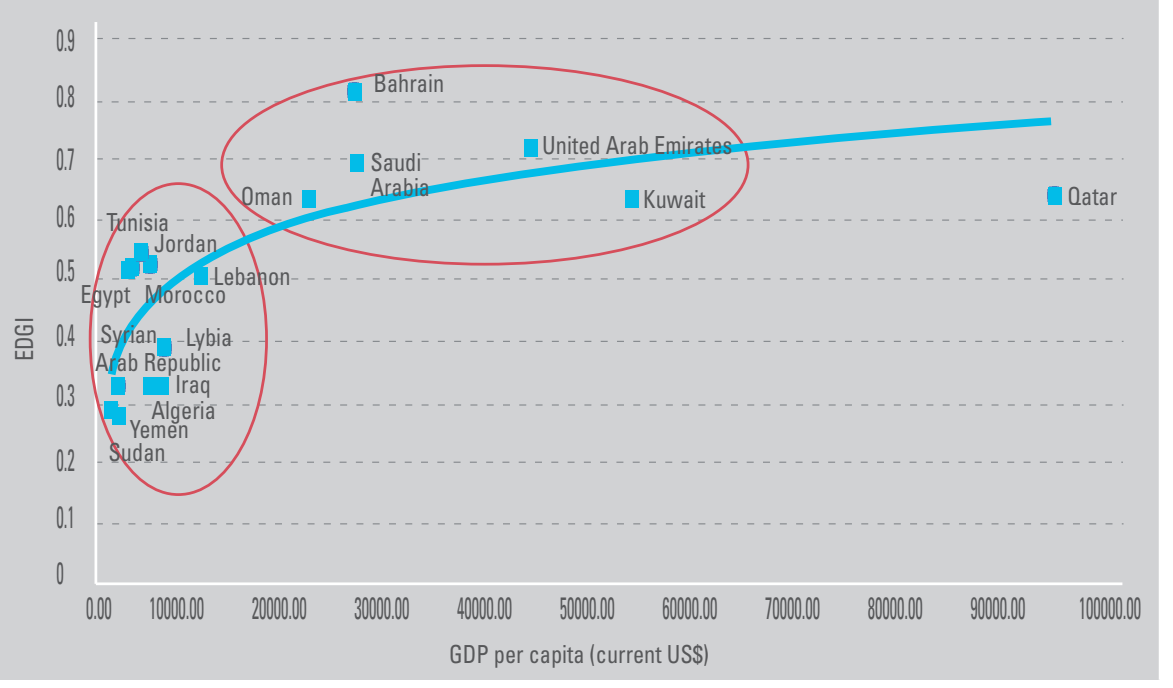
Some countries achieved good results from offering enhanced services (second stage), while GCC countries led the region by providing transactional services (stage three). Saudi Arabia recorded the highest increase, from 13 per cent to 77 per cent in 2012, following efforts to provide integrated e-government services and digital citizen identity verification. In 2014, three Arab countries were among the top 20 with the highest Internet service indexes globally, namely Bahrain (seventh position), the United Arab Emirates (twelfth position) and Saudi Arabia (eighteenth position). Bahrain recorded the best performance in e-participation, with special focus on vulnerable groups especially older persons. Strong government support for the open data and open government initiatives increased transparency, placing Bahrain at the forefront of Arab countries in the Internet services index.

Table 7.3. Implementation levels of e-government services, 2004-2014

Country	I: emerging; II: enhanced; III: interactive; IV: transactional; V: connected																																	
	2004						2005						2008						2010						2012						2014					
	I	II	III	IV	V	Total	I	II	III	IV	V	Total	I	II	III	IV	V	Total	I	II	III	IV	V	Total	I	II	III	IV	V	Total	I	II	III	IV	V	Total
Algeria	75	36	30	0	6	23.70	75	36	29	0	6	23.36	88	28	27	0	0	20.00	28	8	1	4	8	0.098	75	48	8	9	22	0.255	16	18	2	9	11	0.079
Bahrain	88	68	37	0	15	38.30	88	64	44	0	17	39.78	88	70	44	27	26	46.00	93	62	43	46	57	0.730	100	76	81	67	75	0.863	94	80	84	74	82	0.937
Egypt	0	21	10	0	0	9.50	88	53	60	22	7	42.34	100	71	63	29	22	54.00	81	44	29	24	41	0.530	100	64	27	57	53	0.601	81	52	33	56	54	0.591
Iraq	38	14	17	2	4	11.70	25	10	2	0	2	5.11	100	14	6	1	7	10.00	35	11	3	12	12	0.152	75	33	6	26	25	0.288	41	25	5	18	21	0.197
Jordan	88	49	46	0	2	32.80	88	62	58	0	6	41.24	100	73	63	23	33	54.00	74	38	34	34	42	0.533	83	48	31	20	34	0.392	91	41	21	50	48	0.520
Kuwait	0	26	12	0	4	12.80	0	40	26	0	15	23.72	0	60	40	14	26	37.00	60	34	34	14	36	0.460	100	62	48	38	51	0.582	84	52	37	41	52	0.575
Lebanon	88	40	19	0	9	23.00	100	46	43	0	9	32.48	100	48	44	8	15	35.00	47	25	9	14	21	0.267	100	62	17	38	42	0.477	66	41	14	21	34	0.354
Libya	0	0	0	0	0	0.00							38	9	7	4	4	7.00	9	11	2	0	6	0.137							9	11	2	0	6	0.016
Morocco	100	38	18	0	7	21.90	100	37	21	0	7	22.63	0	33	23	1	7	18.00	94	61	40	62	58	0.238	100	62	29	43	47	0.543	94	61	40	62	62	0.693
Oman	0	8	7	0	0	4.70	0	30	19	0	6	16.42	88	53	55	19	19	43.00	69	28	15	20	29	0.368	92	64	48	57	58	0.667	97	64	60	44	65	0.732
Qatar	0	17	8	0	0	8.00	63	36	43	20	9	31.02	88	39	42	26	0	35.00	40	18	22	6	22	0.279	83	64	62	64	65	0.739	91	61	42	47	59	0.654
Saudi Arabia	0	55	31	0	11	29.20	0	62	39	0	20	35.77	100	58	53	8	19	41.00	68	22	13	10	24	0.311	92	60	77	67	70	0.797	94	68	63	53	69	0.772
Sudan	63	18	13	0	6	12.80	63	24	14	0	7	15.33	50	7	7	0	0	6.00	34	14	1	16	12	0.156	67	31	10	19	22	0.255	66	20	2	38	29	0.291
Syrian Arab Republic	0	9	6	0	0	4.70	0	13	4	0	6	6.20	0	30	27	8	11	21.00	10	4	0	2	3	0.041	58	31	4	19	20	0.229	19	7	12	38	18	0.158
Tunisia	88	3	36	0	0	14.60	88	9	30	0	0	14.60	88	7	21	0	0	12.00	76	34	30	20	38	0.483	92	45	29	41	42	0.477	91	61	33	53	58	0.638
United Arab Emirates	75	33	33	32	6	28.80	75	62	79	59	17	58.03	88	68	68	60	37	64.00	68	22	1	10	20	0.251	100	74	83	67	75	0.863	100	77	67	71	78	0.882
Yemen	0	9	7	0	0	5.10	75	17	5	0	0	9.12	88	11	4	0	0	7.00	13	3	0	4	4	0.048	33	7	8	23	15	0.177	66	18	12	35	30	0.307

Source: ESCWA, based on www.un.org/en/development/desa/publications/e-government-survey-2014.html. It should be noted that the weights of the different stages have changed over the years.
Note: Palestine is not included in the survey.

Figure 7.1. Relationship between the E-Government Development Index for 2014 and GDP per capita



Source: ESCWA. GDP per capita data (in current United States dollars) are for 2014, except data for Kuwait, Tunisia and Yemen that are from 2013, and for the Syrian Arab Republic that are from 2012. See http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD; https://data.un.org/CountryProfile.aspx?crName=Syrian%20Arab%20Republic.

Figure 7.1 shows the relationship between the E-Government Development Index (EGDI) for 2014 and GDP per capita. As expected, GCC countries appear at the top of the figure, while other Arab countries are grouped closely in the left part of the figure.

3. E-participation

E-participation entails measuring electronic channels provided by the Government to include citizens in public matters. Arab countries have adopted various approaches to this issue, in the form of unified e-government portals or Web 2.0 tools. Table 7.4 sets out the e-participation index used since 2003 by the United Nations in surveys on e-government. The table highlights significant variations between Arab countries, and in service provision and use.

Bahrain, Egypt, Qatar, the Syrian Arab Republic and the United Arab Emirates surpassed 0.5 per cent in 2012. Egypt, Jordan, Lebanon and Tunisia ranked higher than GCC countries in 2012, but lost their lead, excluding Egypt, in 2012.

4. Government e-procurement

Government e-procurement applications are not a priority for current e-government programmes in the Arab region, despite their importance in increasing transparency, expediting government work and eliminating corruption. Nevertheless, some countries such as Egypt and the United Arab Emirates have e-procurement programmes. Others, including Jordan, are hoping to develop such projects, while Bahrain and Qatar publish ongoing bids on e-government websites.

Table 7.4. E-participation index in Arab countries, 2003-2014

Country	2003		2004		2005		2008		2010		2012		2014	
	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking	Value	Ranking
United Arab Emirates	0.172	27	0.049	34	0.127	36	0.296	41	0.129	86	0.737	6	0.843	13
Bahrain	0.052	34	0.049	34	0.048	41	0.341	36	0.671	11	0.658	8	0.824	14
Morocco	0.138	29	0.033	35	0.032	42	0.00	170	0.129	86	0.395	17	0.804	17
Oman	0.259	22	0.00	37	0.016	43	0.205	60	0.157	76	0.447	16	0.706	24
Tunisia	0.017	36	0.016	36	0.00	44	0.023	152	0.3	39	0.368	18	0.647	33
Qatar	0.000	37	0.016	36	0.048	41	0.182	71	0.129	86	0.632	9	0.608	45
Saudi Arabia	0.034	35	0.039	34	0.064	40	0.318	38	0.100	102	0.632	9	0.569	51
Egypt	0.017	36	0.016	36	0.079	39	0.250	49	0.286	42	0.684	7	0.549	54
Jordan	0.172	27	0.049	34	0.048	41	0.546	15	0.286	42	0.105	28	0.471	71
Kuwait	0.017	36	0.016	36	0.00	44	0.068	116	0.229	53	0.184	25	0.431	77
Lebanon	0.086	32	0.082	32	0.111	37	0.409	28	0.271	45	0.316	20	0.294	110
Sudan	0.121	30	0.033	35	0.032	42	0.205	60	0.100	102	0.079	29	0.275	117
Yemen	0.034	35	0.033	35	0.00	44	0.000	170	0.043	135	0.000	32	0.275	117
Iraq	0.000	37	0.033	35	0.000	44	0.205	60	0.043	135	0.105	28	0.134	152
Syrian Arab Republic	0.000	37	0.000	37	0.000	44	0.046	135	0.014	157	0.026	31	0.098	164
Algeria	0.052	34	0.033	35	0.032	42	0.023	152	0.014	157	0.053	30	0.078	172
Libya	0.000	37	0.000	37	0.000	44	0.205	60	0.171	68	0.000	32	0.059	179
Regional average	0.07		0.03		0.04		0.20		0.18		0.32		0.45	
Global average									0.198		0.2225		0.395	

Source: ESCWA, based on www.un.org/en/development/desa/publications/e-government-survey-2014.html.

B. ICT applications in business and commerce

Today, e-commerce is a key economic driver, aimed at reducing costs and increasing revenue as a result of quick access to new markets. ICT applications in business and trade have boomed following the development of the Web as a place to buy, sell and pay for products and services; complete banking and financial transactions; and provide tourism, airline and transport services.

In the Arab region, businesses are providing Internet services in line with digital developments, an increase in Internet users and improved accessibility. However, there are inconsistencies in e-business across the region because of development differences between GCC countries, Jordan and Lebanon, on the one hand, and other Arab countries, on the other.

The concept of e-commerce has not been easily accepted in the Arab region, excluding GCC countries, because of relatively weak

Table 7.5. Government e-procurement projects in the Arab region

Country	Description
Egypt	In 2007, the Ministry of State for Administrative Development finished implementing the government e-procurement portal, which provides several services such as the electronic registration of suppliers in government bodies; and information on bidding data in all government bodies; and assessments of supplier offers, all while guaranteeing transparency and ease of use. The portal came second in the United Nations Public Service Awards, in the category on transparency and accountability in the public sector. (etenders.gov.eg).
Iraq	The Iraq Relief and Reconstruction Fund has launched promising e-procurement initiatives. Contributing international organizations offer e-procurement services via the Fund for various projects in numerous sectors, such as education, health and construction.
Jordan	The Ministry of Finance, in collaboration with the United Nations Development Programme, is implementing a comprehensive procurement system in the General Supplies Department, which will include an integrated procurement portal, a document management system, a work organization system and e-bidding and e-auction systems.
United Arab Emirates	The Dubai government relies on the Tejari website to procure for local departments, although the website comes under the private sector. However, the Tejari has become a pioneer in e-commerce in emerging markets, following agreements with various government organizations throughout the Arab region, especially in Egypt, Jordan, Kuwait, Lebanon, Oman and Saudi Arabia, on the provision of e-procurement services. Tejari services have assisted the Dubai police, for example, in saving large sums in public procurement. A total of 91 per cent of all Dubai police procurement was done via Tejari in 2010. Tejari.com.

Source: ESCWA.

Internet services, low living standards and high unemployment. There is also a culture of suspicion surrounding business on the Internet, especially in terms of online security and the trustworthiness of systems for e-payment, goods exchange and trademarks. Some banks distance themselves from e-commerce because of perceived threats from Internet fraud, and Governments generally face internal resistance to change.

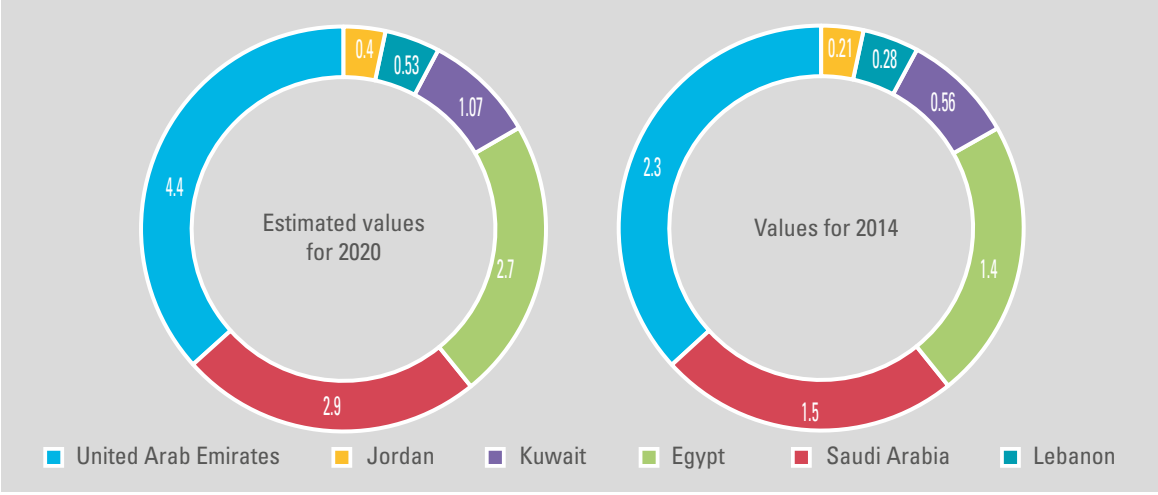
1. Size of e-commerce in the Arab region

Traditionally, e-commerce is divided into the following two main categories: between businesses (business-to-business), and between companies and consumers (business-to-consumer). Arab countries generally lack reliable official data to measure the size of both forms of e-commerce in the region. Global indexes are often unrepresentative, and do not differentiate between national and international trade.

In 2004, according to a study by Madar Research and Development, the value of business-to-business e-commerce in the region was $9 billion, equivalent to 1.45 per cent of regional GDP that totalled $620 billion, compared with a global average of 5 per cent. Business-to-consumer e-commerce was $1.15 billion in the same year, equivalent to 0.18 per cent of regional GDP.

In 2006, the value of goods and non-financial services traded on the Internet between businesses in GCC countries was estimated at $24,742 billion, with a growth rate of 45.5 per cent compared with 2005. Consequently, business-to-business e-transactions reached

Figure 7.2. Size of e-commerce markets in selected Arab countries, 2014 and 2020 (in billions of USD)



Source: ESCWA, based on http://marketing.payfort.com/mailshots/url/sop15/SOP15_Final_En.pdf.

3.45 per cent of total GDP nominal values for the six GCC countries, equivalent to $718 billion compared with 2.83 per cent the previous year. Other Arab countries do not have accurate data on the size of business-to-business e-commerce. Madar Research and Development has estimated business-to-business e-commerce at $3.5 billion and business-to-consumer e-commerce at $3 billion for the region in 2006.

Consumer-to-business rates remain low in the MENA region, not exceeding 1.6 per cent of global e-commerce activities for 2011.[4] Most of these trade activities are one-directional: from within the region to without.

Regarding user number, numerous surveys conducted by the Arab Advisors Group over the period 2007-2008 indicate that half of Internet users in selected Arab countries use e-commerce, and receive purchases via national and foreign e-markets. Surveys for the period 2010-2011 show that Saudi Arabia leads the region in terms of total value of e-commerce transactions, whereby 4.3 million users spent around $3 billion over that period,[5] totalling a 30 per cent increase in spending per e-commerce user compared with 2007-2008.

Figures were lower in Egypt, with 3.9 million users spending $2.1 billion in 2009.[6] ITU published a similar study in 2010, concluding that 20 per cent of Internet users in Jordan and Lebanon and 18 per cent in Egypt use e-commerce.

In 2014, the e-commerce market in Egypt, Jordan, Kuwait, Saudi Arabia and the United Arab Emirates was valued at $7 billion (figure 7.2), and is expected to grow to $13.4 billion by 2020.[7] In comparison, total revenue from e-commerce in the United States reached $5.4 trillion in 2012, noting that business-to-business transactions made up the bulk. No Arab country was among the top 10 for business-to-business revenue.

2. Experiences in business-to-business e-commerce

One successful business-to-business experience is the Emirati tejari.com that lists bids online. Work began on the website in 2000, which grew steadily over the years with revenues reaching $3 billion by 2006. Around 200,000 companies had joined by 2008. In 2009, a study by Forester placed the website in eighth place globally among e-sales sites.

In 2006, GulfTradaNet was established as a business-to-business e-market for trade between GGC countries, under the Federation of GCC Chambers and in partnership with the Saudi IT services company Nesma. It aims to assist small and medium enterprises in joining the e-commerce society while avoiding the high costs associated with installing their own electronic systems.

The automobile trade makes up the bulk of business-to-business e-commerce, followed by IT products, oil and gas, and lastly the government sector. Aramco, for example, has a private market for managing transactions with its suppliers.

3. Experiences in business-to-consumer e-commerce

The electronic portal souq.com is a pioneer in e-commerce in the Arab region. It was established in 2005 and is currently available in Egypt, Jordan, Saudi Arabia and the United Arab Emirates, with headquarters in Dubai Internet City. The portal provides users with access to Internet auctions and retail purchases, with secure payment methods such as credit cards, pre-paid Internet cards, bank transfers and payment upon delivery. In 2008, around 140,000 registered users and 270,000 guests visited the website.[8] Moreover, the taufeer.com portal is a Saudi e-marketplace that offers purchases from across the world.

In 2007, the majority of products and services purchased on the Internet were linked to the tourist sector, such as airline and hotel bookings, totalling around 35 per cent of total e-market sales. Most Arab airlines and large travel companies, such as hoojoozat.com, offer numerous methods for booking tickets and paying electronically. Other products and services purchased online include presents, software, books, IT equipment, food and clothes, in addition to bill payments and stock trading on the stock exchange.

4. E-payment

The weak credibility of and trust in e-payment systems are major obstacles to e-commerce growth in the Arab region. Over the past years, several practical measures have been taken to address these limitations. The Saudi Arabian Monetary Agency established sadad.com, a national body that offers electronic bill payment services to facilitate the process. Since its implementation in 2004, the system has increased overall efficiency and transparency, eliminated corruption and reduced government costs. In 2010, 27.9 million bills were paid via this system, compared with 4.8 million in 2007, totalling $5.85 billion since its establishment. The system won the E-Government Achievement Award in 2010 and the e-payments prize at the sixteenth Middle East E-Government and E-Services Excellence Awards, held in Dubai in 2011.

In the United Arab Emirates, the Ministry of Finance has created the e-dirham to facilitate financial transactions. In Dubai, the e-Government operationalized mPay for the payment of government charges, such as police fines and utility bills, using mobile telephones to facilitate interaction between the Government, citizens and institutions. After registering their credit card details on a secure platform, mPay users can then send payments via text message.

In Qatar, the Government announced in 2011 a plan to establish an e-payment platform to facilitate financial transactions between the Government and citizens, entitled QPay, available on the main government portal, Hukumi, which witnessed a significant increase in e-payments for government services in 2010. Total payments on the portal reached $302 million in 2011, compared with $123 million for 2007.

In Oman, the national e-payment portal, launched in 2008, provides services to ministries and a secure platform for processing

e-payments using credit cards and other e-payment methods.

In the Syrian Arab Republic, the Government launched Tasdid in 2005, through which users can pay bills online or via mobile telephones using pre-paid cards.

5. E-banking

Since 2005, most banks in the Arab region have been offering online banking services to their customers, with delays in Iraq, the Syrian Arab Republic and Yemen. As expected, GCC countries lead in terms of e-service quality and diversity, including the provision of banks statements, bill and credit card payments, and money transfers within and between banks in a country. Most GCC countries also provide mobile services.

The number of commercial banks in Egypt, Jordan and Lebanon has significantly increased over the past few years. Since 2011, e-banking services have become available to varying levels in most Arab countries, excluding Iraq, Palestine, the Sudan, the Syrian Arab Republic and Yemen. For example, Iraq pays pensions via e-cards, provided that pensioners reside in Iraq or in a country with a large Iraqi diaspora, such as Jordan. Iraqi pensioners in Lebanon are expected to benefit from this service in the near future.

E-banking is measured using several indicators, notably the number of e-payment cards and of cash machines compared with population size. For instance, e-card penetration rates have covered around 50 per cent of the population in Bahrain, Kuwait and the United Arab Emirates since 2005.

C. Maturity levels of ICT applications in selected Arab countries

Arab countries can be divided into the following four categories (table 7.6), according to maturity levels of ICT applications:

Table 7.6. Maturity levels of ICT applications in selected Arab countries

Country	2007	2009	2011	2013	2015
Bahrain	4	4	4	4	4
Egypt	2	2	2	2	3
Iraq	1	1	1	1	1
Jordan	3	3	3	3	3
Kuwait	3	2	3	3	4
Lebanon	2	2	2	2	2
Libya	-	-	-	1	1
Morocco	-	-	-	2	3
Oman	2	3	3	3	4
Palestine	1	1	1	1	1
Qatar	3	3	3	4	4
Saudi Arabia	3	3	3	4	4
Sudan	-	1	1	1	1
Syrian Arab Republic	1	1	1	1	1
Tunisia	-	-	-	2	3
United Arab Emirates	4	4	4	4	4
Yemen	1	1	1	2	2
Regional average	2.3	2.2	2.3	2.4	2.6

Source: ESCWA.

Maturity level 1: countries that lack clear strategies or plans on ICT application usage in public services; and have limited implementation and use of this technology in all fields.

Maturity level 2: countries that have developed strategies to digitize some public services, despite challenges in their implementation; and that have progressed in the use of ICT applications in most fields.

Maturity level 3: countries that have moved forward in ICT strategy implementation; and progressed in the use of ICT applications in all fields.

Maturity level 4: countries that have developed and implemented inclusive strategies for all ICT applications; progressed in automating and digitizing information; and improved service quality.

D. Comparative performance of the Arab region

The Arab region has witnessed steady growth in the development and use of ICT applications since the start of the decade, because of an increasing number of Internet users, improved access to international broadband, high demand for smart phones and mobile devices, and the popularity of social networks. Governments and businesses in the region have begun providing e-services to facilitate e-transactions and cloud computing.

Governments are also providing information and services to citizens through relatively developed platforms, especially via specialized e-government portals. According to the E-Government Development Index results, set out in figure 7.3, the total value for the Arab region surpassed the global average of 0.48 in 2014, although it scored considerably lower than the American continent, for example, which reached 0.54. GCC countries came second globally with 0.64, surpassed by only Europe with 0.71.

In 2014, global e-commerce revenue reached $1.471 billion, with the United States scoring highest.[9] Figure 7.4 indicates that the MENA region had the smallest revenue share which is estimated to remain low, totalling only 2.5 per cent in 2018.

In 2015, the United Nations Conference on Trade and Development (UNCTAD) developed a Business-to-Consumer E-Commerce Index as a new tool for measuring e-commerce readiness between countries, and to identify its strengths and weaknesses. The Index is expected to be published annually, and comprises the following four indicators: Internet use penetration, secure servers per 1 million inhabitants, credit card penetration and a postal reliability score (home delivery). To identify key e-commerce needs, it is necessary to highlight its weaknesses in the Arab region. Table 7.7 shows the Index values for 11 Arab countries in 2014. Bahrain was in the lead with 67.4, and ranked thirty-fourth globally. Lack of data for some indicators has caused problems in determining the Index's total value. In Qatar and the United Arab Emirates, there was no data for the postal reliability indicator, which led to a drop in their rankings despite high scores in other indicators. This worked in favour of other countries, such as Lebanon that came fifty-first, and Egypt that came sixty-eighth in the Index rankings.

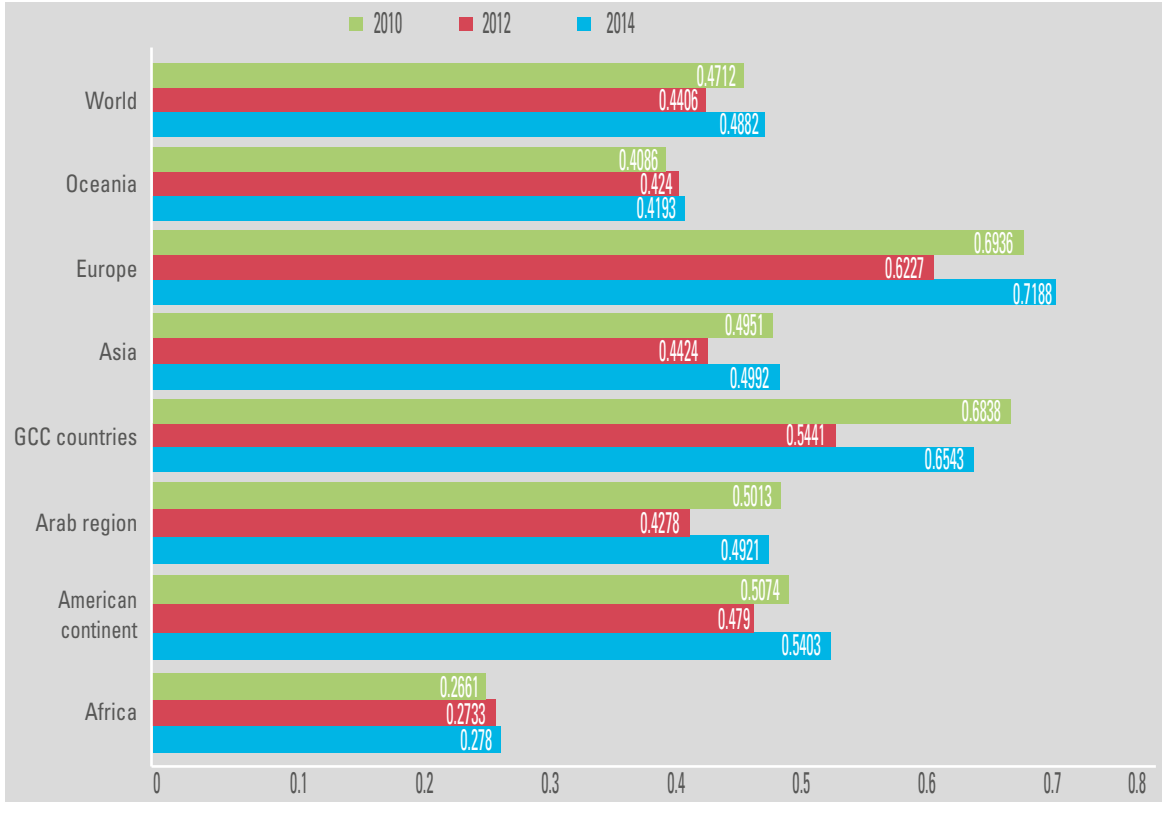
E. Conclusion

The Arab region has several strengths and weaknesses in the field of ICT applications.

1. Strengths

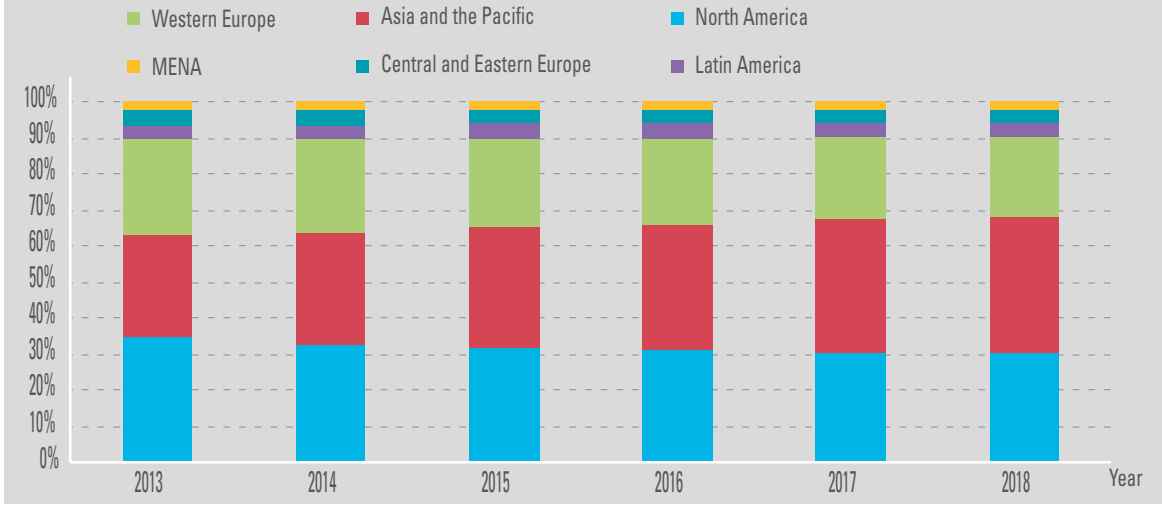
- Arab countries' success, especially GCC countries, in using ICT in public administrations and government services

Figure 7.3. E-Government Development Index in selected regions, 2010-2014



Source: ESCWA, based on e-government surveys for 2010, 2012 and 2014. Available from www.un.org/en/development/desa/publications/connecting-governments-to-citizens.html.

Figure 7.4. Shares of global e-commerce revenue, 2013-2018 (%)



Source: ESCWA, based on eMarketer. www.emarketer.com/Article/Worldwide-Ecommerce-Sales-Increase-Nearly-20-2014/1011039.
Note: According to eMarketer, e-commerce comprises goods and services purchased online, including travel bookings, regardless of the device and payment and delivery methods used.

Table 7.7. UNCTAD Business-to-Consumer E-Commerce Index, 2014

Country	Percentage of the population with postal home delivery (2012 data or most recent data)	Percentage of credit card users (15 years and over, 2011)	Percentage of Internet users (2013 data or most recent data)	Secure Internet servers per 1 million people	UNCTAD Index	Rankings
Bahrain	100	19.3	73.0	77.2	67.4	34
Lebanon	100	11.4	52.0	67.6	57.7	51
United Arab Emirates	0	30.0	85.0	79.8	48.7	66
Egypt	99	1.4	44.1	47.2	47.9	68
Qatar	0	32.3	69.3	78.3	45.0	73
Tunisia	93	4.3	21.0	60.1	44.6	74
Morocco	72	4.5	53.0	47.6	44.3	75
Oman	5	26.6	67.0	70.6	42.3	81
Syrian Arab Republic	85	2.8	24.3	30.6	35.7	87
Jordan	10	3.5	41.0	63.8	29.6	95
Iraq	65	1.7	7.1	26.6	25.1	104
Sudan	15	0.6	21.0	11.2	11.9	121
Comparison between regions						
Arab region	53	11	46	55	41	
Africa	27	4	13	43	22	
Asia and Oceania	60	14	34	57	41	
Latin America and the Caribbean	70	12	44	67	48	
Economies in transition	94	9	45	59	52	
Advanced economies	98	42	79	90	77	

Source: United Nations Conference on Trade and Development (UNCTAD) (2015), Information Economy Report 2015.

- Continual rise in the E-Government Index in several countries, especially GGC countries
- Development of online portals for government services in most countries
- Achievements in business-to-business and consumer-to-business e-commerce.

2. Weaknesses

- Insufficient resources for implementing e-government initiatives
- Difficulties in re-engineering an enabling environment for e-government, despite its importance to facilitating institutional linkages within Governments and to promoting coordination and coherence between government bodies
- Low priority of government e-procurement applications in e-government programmes that are being implemented in most Arab countries
- Low business-to-consumer e-commerce rates
- Lack of secure e-payment methods and awareness of its mechanisms
- Absence of a unified e-market for the Arab region that covers both the public and private sectors.

3. Recommendations

- Identify resources needed for implementing e-government initiatives, improving government services and providing interactive services that meet citizens' needs
- Appoint a national coordination body with powers over departments and ministries to facilitate planning, implementation and monitoring of e-government projects
- Redesign the e-government enabling environment to facilitate linkages between government institutions and encourage coordination and coherence between government bodies
- Simplify government procedures and transactions and redesign them before moving them online, and go beyond digitally translating only existing services
- Provide interactive services for citizens, urging users to give their views and enhance their participation using Web 2.0 tools and social networks
- Improve access to e-government tools at reasonable prices
- Increase employee and citizen awareness of the importance of e-government, including e-baking, to combat resistance to change
- Implement laws on e-transactions and e-signatures, increase cybersecurity, and promote private sector initiatives on e-commerce and e-business
- Provide secure and varied e-payment options, and establish national e-payment portals and raise awareness of them
- Offer organized training to employees, especially government staff and business owners, on ICT and its applications
- Establish a single e-market for the Arab region that includes both the public and private sectors
- Encourage entrepreneurship by women and young people in e-commerce, given that it is a promising sector for the Arab region
- Promote cooperation between Arab countries to exchange expertise and good practices, and develop applications used in more than one Arab country.

Social media and interactive websites have proven to be key tools for enriching digital Arab content, including local content.

8. Cultural diversity and identity, linguistic diversity and local content

Local digital content falls under the WSIS action line on improving cultural and linguistic diversity on the Internet, with the aim of bridging the digital linguistic divide. ESCWA deems any material drafted in Arabic in digital format on websites, Internet portals or DVDs of any kind (including audio and visual content) as DAC. That also includes software, databases and information systems using Arabic in their functions, tools and interfaces, and Arabic language processing programmes.

A. Arabic content on the Internet

Growth in the online presence of Arabic between 2003 and 2015 was more than satisfactory in various respects, including in terms of the overall volume of DAC, the rising number of users producing content or accessing it from within the Arab region, and the increase in the number of specific DAC development initiatives and programmes. The importance of DAC was reaffirmed at the ITU Connect Arab Summit in 2012, where it was included in the list of regional priorities.[1] The United Nations Group on the Information Society (UNGIS) stressed in its Joint Statement on the Post-2015 Development Agenda the need for relevant content in order for ICT to be a tool for achieving development goals.[2] The development of Internet infrastructure, deployment of broadband, international Internet bandwidth capacity and the growth of local content are all closely linked.

However, the most optimistic assessments today still suggest that digital Arabic content on the Internet does not exceed 2-3 per cent of all searchable web pages, while the Arab region makes up 5 per cent of the world's population. Table 8.1 charts the trends in volume of Arabic-language web pages in each country as a share of the total number of such pages in the region as a whole, and as a share of the total number of web pages in each country. It shows that Morocco, Saudi Arabia and the United Arab Emirates contribute the most to enriching Arabic content in the Arab region, possibly because they provide significant State support in that area. As far as individual countries are concerned, Iraq, Palestine, the Syrian Arabic Republic and the Sudan, in which Arabic is the default language in most fields, are leading the way in in the production of Arabic-language web pages.

The measurement methodology in the table relies on calculating the number of pages in the country-code top-level domains (ccTLD). This may account for the low numbers in countries such as Egypt, where some content may appear in generic top-level domains (gTLDs) such as .org or .com. Indeed, according to a report by the Arab Thought Foundation, use of ccTLDs in the Arab region does not exceed 13 per cent.

It should be noted that measuring digital content trends in any language is fraught with difficulty, and the number of indicators used by international organizations and individual countries is growing. Some measure trends in the use of domain names in a given country's official language, others the number of websites registered under the country code, and still others the share of content available in the local language, in spite of difficulties associated with that approach. For example, figure 8.1 shows Arabic in fourth place in terms of the percentage of Internet users, even though it experienced a higher growth rate

Table 8.1. Arabic-language web pages in selected Arab countries

	Arabic-language web pages as a share of regional total (percentages)				Arabic-language web pages as a share of total pages in Arabic and English, by country (percentages)			
Country	**2005**	**2007**	**2013**	**Ranking**	**2005**	**2007**	**2013**	**Ranking**
Algeria	..	..	3	8	..	..	52	7
Bahrain	3	3	1	18	39	68	36	15
Egypt	18	10	7	4	12	57	46	11
Iraq	..	1	2	11	..	98	81	2
Jordan	4	6	4	6	33	66	50	9
Kuwait	3	13	2	12	51	82	38	14
Lebanon	1	4	1	14	5	43	17	18
Libya	..	..	3	9	..	..	49	10
Morocco	..	..	11	3	..	..	58	5
Oman	1	2	1	16	28	64	44	12
Qatar	2	2	1	17	34	52	21	17
Saudi Arabia	36	19	28	1	67	77	55	6
State of Palestine	11	9	6	5	63	81	72	3
Sudan	..	..	1	15	..	..	71	4
Syrian Arabic Republic	2	14	4	7	94	96	82	1
Tunisia	..	..	3	10	..	..	40	13
United Arab Emirates	18	16	19	2	22	65	24	16
Yemen	1	1	1	13	47	78	51	8

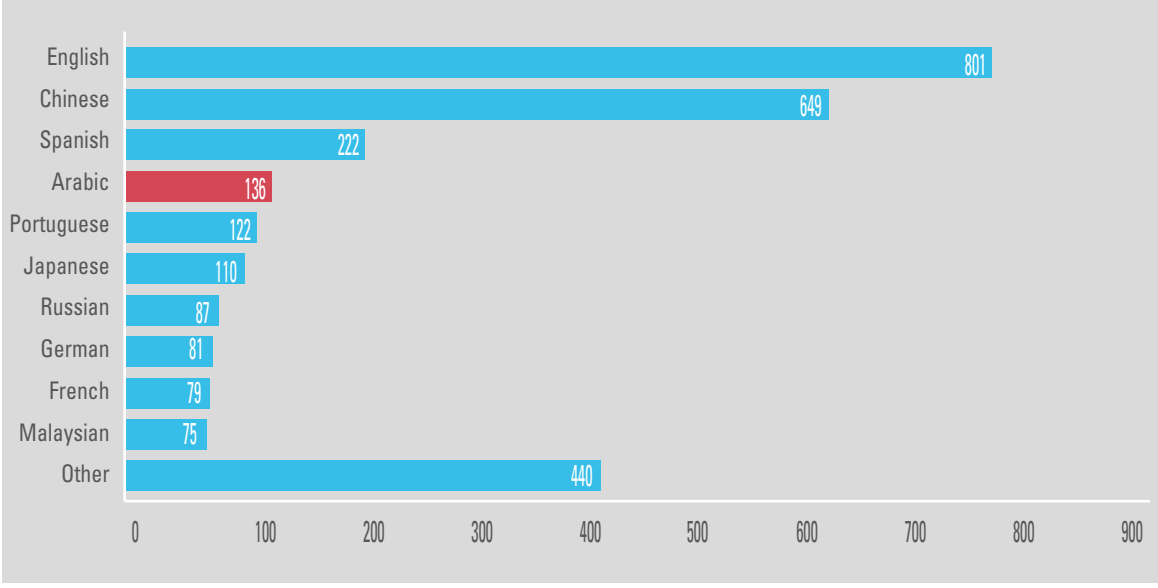
Source: Madar Research and Development, Arab ICT Use and Social Network Adoption Report, 2012.
Notes: Measurements are based on the number of country code top-level domains (ccTLDs). Although imperfect, such an approach gives an idea of the region's contribution to DAC enrichment. French content produced by Maghreb countries has not been taken into account.
(..) indicate that data are unavailable.

compared with other languages, at a rate of 5.297 per cent between 2000 and 2013.

B. DAC development and the role of Governments and regional organizations

Governments play a vital role in developing DAC, by making content of State institutions available to the public and fostering an environment conducive to the generation of content by all private sector, civil society and individual stakeholders. Some Arab countries have made specific provisions for digital content in their national ICT strategies. For example, Morocco's digital strategy priorities for 2009-2013 include the development of local digital content.[3] Egypt has also built DAC into its latest ICT policies for 2012-2017.[4] In November 2014, the Egyptian Ministry of Communications and Information Technology launched its national DAC strategy, aimed at fostering a favourable environment for developing a variety of DAC initiatives in line with international standards. It includes a range of strategic objectives, such as the digitization of Arab culture, the development of a strong digital content industry that can contribute effectively to economic growth and generate job opportunities, and the participation of users in content enrichment. Similarly, one of the three action lines in the Arab ICT Strategy: Building the Knowledge Society 2007-2012

Figure 8.1. Top 10 languages used online, 2013 (millions of users)



Source: Internet World Stats. www.internetworldstats.com/stats7.htm.
Note: There were 2,802,478,934 Internet users worldwide in December 2013.

focuses on developing a DAC industry and services.

Arab countries have launched a range of DAC development initiatives. In the United Arab Emirates, the Telecommunications Regulatory Authority set up the ICT Fund, with a $25 million budget earmarked for DAC.[5] In Saudi Arabia, the King Abdullah initiative for Arabic content, which encompasses a range of projects and activities, is seen as one of the most important and comprehensive regional initiatives for enriching Arabic online content.[6] Jordan has set up an ecosystem to stimulate the development of digital content, relying on national and local university curriculums and with support from enterprise centres like the Queen Rania Centre for Entrepreneurship.[7] Qatar, meanwhile, included a dedicated digital content programme in its 2015 national ICT plan. The Kuwait Foundation for the Advancement of Sciences, which held its fifth session this year, presents its Kuwait E-Content Award annually with a view to encouraging the generation of local e-content.[8]

Efforts to digitize cultural and historical heritage in Arab countries remain scanty, especially at the regional level. Nevertheless, some pilot projects deserve mention, including the Alwaraq website (www.alwaraq.com) for heritage books, established by the Cultural Foundation in Abu Dhabi; Memory of the Arab World, a joint Arab project launched in 2007 to harness ICT to preserve Arab heritage in a bilingual web portal; projects carried out by the Centre for Documentation of Cultural and Natural Heritage (cultnat.org) in Egypt; the digital assets repository system developed by the Bibliotheca Alexandrina (Library of Alexandria) in Egypt; and the eSyria (Homeland Blog) website (www.esyria.sy), which was launched in the Syrian Arabic Republic in 2008; work carried out in 2012 to digitize manuscripts owned by the Sultanate of Oman; the partnership between the Qatar Foundation for Education, Science and Community Development and the British Library to digitize and catalogue historical and heritage materials, which concluded in mid-2013 having processed more than 85,000 pages of material

Box 8.1. Digital libraries and archives: selected examples

- American University of Beirut (AUB; www.aub.edu.lb/main/academics/libraries/Pages/index.aspx): in 2014, AUB libraries joined a global project funded by New York University in Abu Dhabi, to digitize more than 100,000 volumes of Arabic content. The university libraries house more than 1.2 million print and digital books and 10,000 periodicals, including 3,500 in Arabic, as well as databases, audio-visual content, images and rare archive collections.

- Bibliotheca Alexandrina (www.bibalex.org): The Library of Alexandria is at the cutting edge of digital content, providing various kinds of material in a number of languages. By 2015, the library's digital assets encompassed more than 194,000 publications in Arabic, a range of specialized libraries, interactive presentations, the Culturama (cultural panorama) and various exhibitions. Projects include a host of diverse cultural, historical, geographical, civil and language digitization activities.
- World Digital Library (www.wdl.org/en): founded in 2009, this joint initiative between the United States Library of Congress and UNESCO has been joined by libraries from around the world. It provides free online material and strives to build capacity in participating institutions. By 2015, it contained 12,053 items in Arabic on 193 countries.

- Electronic village (www.electronicvillage.org): this digital heritage library based in Abu Dhabi contains a number of specialized libraries, including Al-Waraq (www.alwaraq.net), Waha al-Mutanabi (www.almotanabbi.com) and Irtiyya al-Afaq (http://alrihlah.com).
- Obeikan (http://obeikandl.com): a private sector digital library and bookshop with large book and story collections in various languages, including Arabic. They are available for purchase through the online bookshop.

- Dubai Digital Library Digital (http://estore.ddl.ae/index.html): the Mohammed bin Rashid Al Maktoum Foundation launched this new initiative in 2015 with a view to creating an e-platform to access a vast array of Arabic-language books. It will make 1,600 books available in the initial phase of its rollout. http://www.albayan.ae/five-senses/east-and-west/2015-05-11-1.2372049

Sources: www.aub.edu.lb/news/2014/Pages/arabic-digital-library.aspx; www.wdl.org/ar; http://dar.bibalex.org/webpages/searchresults.jsf; www.electronicvillage.org; and www.albayan.ae/five-senses/east-and-west/2015-05-11-1.2372049.

specifically Gulf history;[9] and national heritage conservation projects in Kuwait and Bahrain. Digital libraries play a pivotal role in digitizing and archiving materials. Box 8.1 looks at the efforts of certain libraries in the Arab region in this regard.

Since 2013, ESCWA, the Egyptian Ministry of Communications and Information Technology and the Arab Regional Office of the ITU have been organizing an annual regional DAC forum under the aegis of the League of Arab States. For more information on the forum, see chapter X of the present report.

Since 2004, ESCWA has prepared a wide range of studies on the development of the DAC industry and carried out initiatives specifically aimed at stimulating innovation and entrepreneurship in this area (box 8.2).[10]

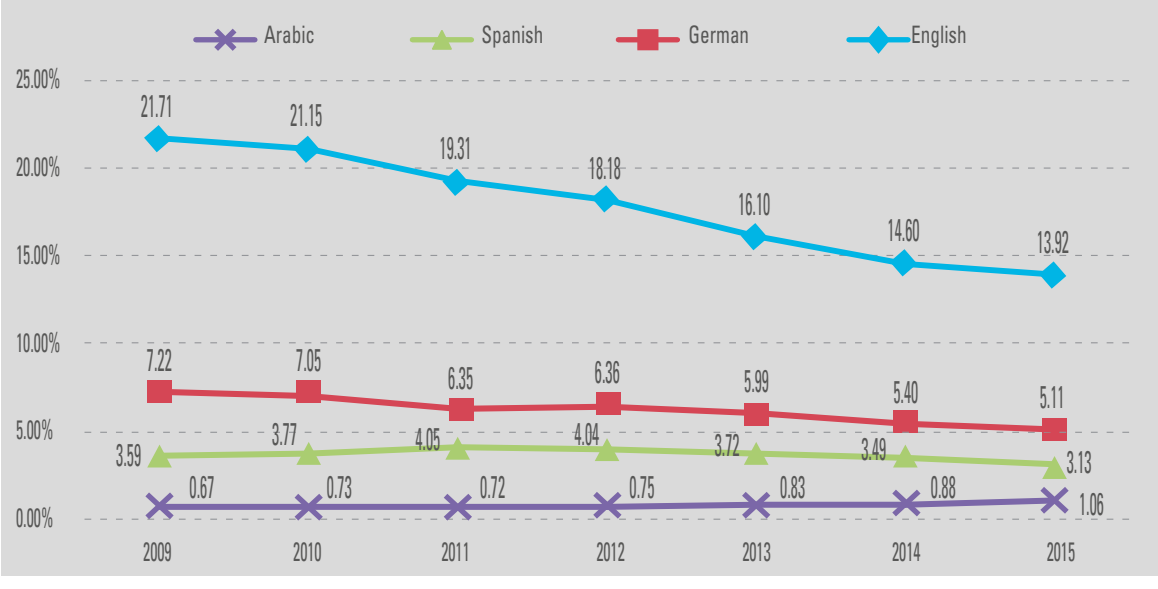
C. Local community content and social networking platforms

Social networking platforms and interactive websites have become increasingly important as tools for enriching local content, including digital Arabic content. Wikipedia users, for

Box 8.2. ESCWA initiative on the Promotion of the Digital Arabic Content Industry through Incubation

In early 2015, ESCWA concluded a series of activities that had been running for some years in the framework of its initiative on the Promotion of the Digital Arabic Content Industry through Incubation. They included awareness-raising campaigns, workshops, studies and research reports, and the staging of national competitions. ESCWA organized national DAC competitions in 2013 and 2014 under the slogan "Thinking digital? Let's innovate in Arabic" in Egypt, Lebanon, Palestine, Tunisia, the United Arab Emirates and Yemen, in search of the top, most innovative DAC product and application ideas. The competitions were run jointly with national technology incubators and aimed at university graduates and entrepreneurs. ESCWA activities and partnerships have boosted awareness of the importance of the DAC industry and underlined how the attitudes of States and the private sector in the area have changed.

Figure 8.2. Language set shares in Wikipedia (by number of articles in all languages), 2009-2015



Source: ESCWA, based on statistics available at http://stats.wikimedia.org/EN/TablesWikipediaZZ.htm.

example, are free to place and review content in accordance with the site's norms. The share of Arabic content (the number of articles in Arabic) on Wikipedia has risen, albeit slowly, but remains extremely low compared with digital content in other languages, owing to limited access and poor infrastructure in Arab countries and a shortage of the necessary technical and editorial skills.[11] While statistics show the share of Arabic-language articles rising slightly until 2015, the share of English-language content dropped significantly, in all likelihood because of the growing number of articles in other languages (figure 8.2).

Arabic was one of the fastest-growing languages on Facebook between 2010 and 2012 (in ninth place in November 2012).[12] Since 2011, the share of users preferring to use Facebook's Arabic language interface

has increased in most Arab countries. Interestingly, however, the reverse has been true in GCC countries, perhaps because of the growing availability of other languages preferred by expatriate residents. A whole range of initiatives, such as Taghreedat and the Qordoba translation website, which have featured in earlier editions of this study, continue to collect content in the public sphere. In Jordan, the medical website Al-Tibbi boasts a network of around 7,500 doctors who publish articles and answer questions from users. It receives more than 160,000 unique hits per day.[13]

D. Arabic software industry and research and development programmes

1. Role of the private sector

Arab software manufacturing for mainframe computers began in the 1970s and grew in the microcomputer era, especially in Egypt and GCC countries, but has faced several challenges over the years. Key companies in the industry include Sakhr Software in Kuwait that has developed tools to support DAC, such as optical character recognition. Search engines in Arabic have also emerged, such as *Arabi and Ayna*, but neither have achieved the desired success. Digital content enterprises have been established in several Arab countries, such as Flagship Projects in the United Arab Emirates that is a pioneer in mobile Arabic applications and Rubicon Group Holding in Jordan that has been developing educational and entertainment applications since 2004.

Some Arab countries have a more active private sector than others. Jordan has a flourishing sector for developing DAC services and applications; it also has a national system that supports ICT entrepreneurships and startups and bodies that promote DAC, such as institutions, business incubators and ICT universities. Some successful startups have been launched in Lebanon, including Zoomal that supports innovation in the Arab region through crowd funding and provides various fund transfer and e-payment methods.

Box 8.3. Investments in digital content companies in the Arab region

The takeover by Yahoo of the Jordanian company Maktoob is considered one of the largest of its time. In 2009, Yahoo bought Maktoob for the colossal sum of $164 million, indicating Yahoo's faith in the growth of digital content in the Arab region and the considerable gains that it would result in.[15] The past few years have seen investments in other digital content companies in the region, including the following recent purchases:

- The Parisian company Webedia bought shares worth $12.75 million in Diwani,[16] a digital media company that builds websites on various issues such as health, family, entertainment and e-commerce, with over 5 million visitors daily.[17] Originally, Diwani was a Lebanese company and has many women in leadership positions
- South African Napsers Limited invested $75 million in Souq.com, a popular e-shopping site in the Arab region with headquarters in Dubai
- The Japanese company Cookpad bought Shahiya for $13.5 million, a site established in Lebanon for recipe exchange. It has had over 3 million visitors monthly since 2013[18]
- The Berlin-based Rocket Internet bought Talabat for $170 million, a Kuwaiti/regional food delivery company.

Source: https://issuu.com/arabnetquarterly/docs/magazine_issue_4.

The DAC market was estimated at $7.1 billion in 2011.[14] In the same year, Internet content, including advertisements and user-generated content, was estimated at $11.2 billion and was expected to reach $16.5 billion by 2015, making this market a self-sufficient industry. Box 8.3 sets out developments in the digital content sector in the Arab region resulting from investments over the period 2014-2015.

2. Research and development

Natural language processing tools for Arabic remain largely limited to research programmes in universities and research and development centres in the Arab region. This field provides many collaboration opportunities in research, development and innovation activities, and promotes links between universities and research centres, on the one hand, and the market, on the other. Natural language processing tools for Arabic entail text processing, speech and letter recognition, transforming written files into audio files (text-to-speech) and vice versa, semantic and content-based search engines, machine translation and automated diacritics. These tools have several uses on the Web, mobile telephone applications and e-services.

Key research bodies in the area of processing Arabic language and digital content include King Abdulaziz City for Science and Technology in Saudi Arabia, which has developed products for machine translation, interactive dictionaries and search engines. Some startups in the region have launched Arabic language processing projects, including companies that graduated from an ICT incubator in the Syrian Arab Republic, such as Arabi that has developed a tool to automatically place diacritics over Arabic text; Votek that compiled a library of private services for Arabic speech recognition; and Abjad Hawaz that designed a semantic and content-based search engine for Arabic text.[19] Global companies, such as Google and Yahoo, have departments that develop Arab language tools; Google Translate relies on statistical machine translation.[20] Other key private sector initiatives are being implemented, including an English to Arabic translation system entitled Misbar. However, the quality of translations into Arabic can be poor because of a lack of Arabic content on the Internet, which has led to the launch of the Arab Web Days initiative.[21]

Universities and research centres that implement Arabic language processing projects include the Qatar Computing Research Institute, the Higher Institute of Applied Science and Technology in the Syrian Arab Republic, the King Abdulaziz City for Science and Technology in Saudi Arabia, and Mohammed I and Mohammed V universities in Morocco.

E. Arabic Internet domain names

Using internationalized domain names (IDN) in various languages, especially Arabic, assists in bridging the digital language divide and enhancing DAC for users who do not master a second language. By July 2013, 13 countries had obtained country code top-level domains (ccTLD) in Arabic, as shown in table 8.2. At the time of writing, statistics indicated that registered country code domain names in Latin characters totalled 6,953 in Algeria, 4,551 in Jordan, 57,000 in Morocco and 41,000 in Saudi Arabia;[22] whereas there were not many domain names in Arabic letters.

The Internet Corporation for Assigned Names and Numbers (ICANN) has approved the new Arabic TLDs ".arab" and its IDN equivalent ".عرب", which will belong to the League of Arab States and will be operated by the Telecommunications Regulatory Authority of the United Arab Emirates. ESCWA has played a key role in providing technical guidance on all activities leading to the application of these new domains to ICANN.

Table 8.2. Country code top-level domain names in Arabic

Country	Country code top-level domain names in Arabic	Country code top-level domain names in Latin characters	Registration date
Algeria	.الجزائر	.dz	February 2011
Egypt	.مصر	.eg	May 2010
Iraq*	.عراق	.iq	September 2014
Jordan	.الاردن	.jo	August 2010
Morocco	.المغرب	.ma	February 2011
Oman	.عمان	.om	February 2011
Palestine	.فلسطين	.ps	August 2010
Qatar	.قطر	.qa	December 2010
Saudi Arabia	.السعودية	.sa	May 2010
Sudan*	.سودان	.sd	November 2012
Syrian Arab Republic	.سورية	.sy	February 2011
Tunisia	.تونس	.tn	August 2012
United Arab Emirates	.امارات	.ae	May 2010

Source: www.iana.org/domains/root/db.
*As of 23 March 2015, these domain names had not been applied in root zones.

F. DAC maturity levels in selected Arab countries

Arab countries can be divided into the following four countries (table 8.3), according to DAC maturity levels for the period 2005-2015:

Maturity level 1: countries with weak DAC that contribute little to its enrichment; and that do not make sufficient efforts at the institutional and individual levels in digital preservation and documentation.

Maturity level 2: countries with a growing DAC and developments in digitizing heritage; and that have established a sector for DAC creation.

Maturity level 3: countries that have made developing DAC a national priority, and that have witnessed significant growth in DAC creation and the development of related e-services.

Maturity level 4: countries with advanced DAC creation and related e-services and applications.

G. Comparative performance of the Arab region

The rising number of Internet users in the Arab region has highlighted the issue of accessing content, information and knowledge. There are relatively fewer information sources available to Arab speakers per capita than those available in other languages. To enable citizens to use their growing capacity for communication and digital content creation, several activities have been implemented to

Table 8.3. DAC maturity levels in selected Arab countries

Country	2005	2007	2009	2011	2013	2015
Bahrain	2	2	2	3	3	3
Egypt	3	3	3	3	3	4
Iraq	1	1	1	1	1	2
Jordan	3	2	2	3	3	4
Kuwait	2	3	3	3	3	3
Lebanon	2	2	2	2	2	2
Libya	-	-	-	-	1	1
Morocco	-	-	-	-	2	2
Oman	1	2	2	2	2	2
Palestine	2	1	2	2	2	2
Qatar	2	2	3	3	3	3
Saudi Arabia	3	3	3	4	4	4
Sudan	-	-	1	1	1	1
Syrian Arab Republic	2	3	3	3	3	3
Tunisia	-	-	-	-	2	2
United Arab Emirates	3	3	3	4	4	4
Yemen	1	1	1	1	1	1
Regional average	2.1	2.2	2.2	2.5	2.4	2.5

Source: ESCWA.
Note: Data do not cover Libya, Morocco and Tunisia prior to 2011, because they joined ESCWA in 2012.

promote the use of Arabic in the digital media, including an ESCWA initiative to promote the DAC industry through technology incubators. DAC has improved since 2008 when it made up 0.3 per cent of total Internet content, compared with 2-3 per cent in 2012.

Figure 8.1 shows that Arabic ranked among the top 10 languages used on the Internet. Although 4.8 per cent of Internet surfers use Arabic, it came fourth globally ahead of German that fell to eighth place. Despite this improvement, data show that efforts to update DAC, especially qualitative content, are insufficient in relation to general Internet content growth.

H. Conclusion

The Arab region has several strengths and weaknesses in the field of DAC.

1. Strengths

- Continued growth in DAC and in the number of users that create it or access it from the Arab region, especially on social networks, although it remains relatively weak
- Initiatives and approaches for developing DAC in national strategies for the ICT sector
- Successfully launching Arabic domain names.

2. Weaknesses

- Limited efforts to digitize cultural and historical heritage in Arab countries, especially at the regional level
- Challenges facing the Arab software industry and weak related research and development activities.

3. Recommendations

- Develop strategies and action plans to

enrich DAC at the national and regional levels; and enact legislation to strengthen intellectual property rights in the fields of digital content and publication and related software

- Expedite the implementation of Arabic e-government projects and the launch of Arabic e-services by earmarking necessary resources to increase DAC
- Support initiatives on digitizing and preserving heritage and promote current e-archiving projects, especially concerning Arabic manuscripts and heritage
- Facilitate the establishment of a national enabling environment for projects and startups that focus on DAC applications, so as to transform DAC into a sufficiently lucrative industry
- Strengthen Arab cooperation by launching regional initiatives to develop DAC
- Include measures to strengthen DAC in higher education programmes, and support scientific research in the field
- Develop quality standards and criteria to improve DAC
- Compile a list of indicators on digital content to be adopted at the regional level.

The ICT sector if a key pillar of the knowledge-based economy. Despite moderate progress in the Arab region, rapid institutional and structural reforms remain critical to the creation of employment opportunities for young people.

9. Building the ICT sector

Studying the ICT sector as an economic sector requires looking beyond the services it provides to its outputs, products and effects on the economy in general. The sector is still relatively nascent in Arab countries, and is primarily import-controlled. ICT actors in the region have a limited role at the global level, excluding some successful experiences.

The process of building the ICT sector faces significant challenges that impede its development and competitiveness. Challenges include a lack of government facilities and incentives, such as tax cuts, affordable bank loans, urban-rural inequalities in service provision; and weak funding mechanisms, business-enabling environments and infrastructure. Moreover, the private sector in the region suffers from oligopoly and duopoly in ICT.

A 2012 study by the World Bank and the International Finance Corporation on the ease of doing business indicators[1] shows that the

Table 9.1. Ease of doing business index in selected Arab countries, 2009-2014

Country	Ranking 2009	Ranking 2010	Ranking 2012	Ranking 2013	Ranking 2014
United Arab Emirates	37	40	26	25	22
Saudi Arabia	12	11	22	44	49
Qatar	39	50	40	45	50
Bahrain	25	28	42	53	53
Tunisia	..	..	50	56	60
Oman	57	57	47	60	66
Morocco	..	..	97	68	71
Kuwait	69	74	82	79	86
Lebanon	109	113	115	102	104
Egypt	99	94	109	113	112
Jordan	107	111	106	116	117
Yemen	104	105	143	135	137
Palestine	133	135	135	139	143
Algeria	..	..	152	147	154
Iraq	166	166	165	146	156
Sudan	153	154	..	153	160
Syrian Arab Republic	144	144	144	165	175
Libya	..	..	..	188	188

Source: World Bank (2015), World Development Indicators. http://data.worldbank.org/indicator/IC.BUS.EASE.XQ.
Notes: The first rank refers to the most business-friendly regulations. Data for 2009 and 2010 are taken from the 2011 Regional Profile.
(..) indicate data are unavailable.

Arab region still lags behind in implementing organizational reforms to improve business environments and in offering assistance to entrepreneurs. Although Arab countries have improved organizational processes in general, especially in terms of startups, institutions concerned with legal affairs and investor protection remain weak.

In 2014, the United Arab Emirates ranked first in the region in the ease of doing business index of the World Bank,[2] and went from twenty-fifth place globally in 2013 to twenty-second place in 2014 (table 9.1). Nevertheless, most Arab countries dropped in the rankings, especially Iraq and the Syrian Arab Republic that fell 10 places because of political instability, and laws and organizations that complicate business establishment and foreign investment in Arab markets. In general, there is a need to accelerate institutional and market reform, to stimulate the ICT private sector in the region, and to provide more employment opportunities for young entrepreneurs.

A. ICT companies

ICT companies in the Arab region can be divided into the following two categories: telecommunications companies that are operators and service providers, and companies specializing in ICT systems that carry out retail selling and distribute equipment, computers, software and applications. The latter also offer after-sales services, and a relatively small number provide integrated solutions, such as networking solutions and Web applications, and advisory services. In general, these companies have limited capital compared with telecommunications companies. Software companies in several Arab countries, such as the Syrian Arab Republic, have faced difficulties and crises over the past years, and many have moved to providing website design and other online services.

Since the start of the twenty-first century, telecommunications companies have dominated the sector in the region, with much larger business portfolios, funding and investments and greater employment opportunities than other companies. Some, such as the Emirati Itisalat, are considered corporate giants. Telecommunications services make up the greater part of the ICT sector in the region. In general, Internet service providers and application service providers are considered medium-sized companies in the ICT sector, as is the case in Egypt, for example. Many such companies are directly linked to telecommunications companies or make up sections of them.

Technology areas in many Arab countries, including Egypt, and technology and business incubators contribute significantly to increasing the number of ICT companies and to facilitating the establishment of startups, especially small and medium enterprises. Box 9.1 reviews ICT companies in selected Arab countries.

Regarding women's participation in the business sector, 35 per cent of technology entrepreneurs are women in GCC countries, compared with 23 per cent in other Arab counties, which is much higher than the global average of 10 per cent.[3] Women in the region consider that it is easier to establish an online company that they can manage themselves, rather than entering a male-dominated labour market.[4] Arab countries must therefore develop systems and strategies that take national cultures into account, so as to encourage more men and women to invest in startups and participate in technological work.

B. ICT sector contributions to national economies

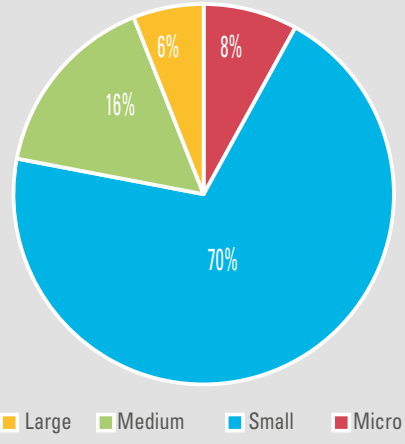
The ICT sector is a key economic pillar of the knowledge-based society. Economically, the sector has developed satisfactorily in

Box 9.1. ICT companies in selected Arab countries

There were 442 ICT companies in Jordan in 2009, compared with 559 in Lebanon and 804 in the Sudan in 2011. In 2010, there were 576 in Bahrain. However, these numbers remain low for a developing sector.

In Egypt, there were 3,500 ICT companies in January 2010, rising to 3,972 in January 2011 – a 13.49 per cent rise in one year. IT companies make up the majority of companies in the ICT sector (78 per cent or 3,106 of 3,972 companies). IT system service companies total 14 per cent, compared with 8 per cent for telecommunications companies. ICT companies in Egypt employ 205,280 individuals, noting that the majority (70 per cent) are small enterprises (see figure).

ICT company distribution in Egypt



Source: 2011 Regional Profile, and www.mcit.gov.eg/Upcont/Documents/ICTinBriefFeb2011-E.pdf.

the region over the past years. However, appropriate indicators must be developed to measure its contribution to national economic growth.

1. Investment, revenue and spending in the telecommunications sector

Several studies show that proper investment in the ICT sector leads to considerable benefits for economic growth, for various service sectors such as health and education, and for social cohesion. The sector's contribution to economic growth can be measured using investment, revenue and spending indicators in the field of telecommunications.

Table 9.2 shows telecommunications revenue in selected Arab countries from 2008 to 2012. Over that period, revenues varied between 2 per cent and 5 per cent of national GDP; however, the regional average was higher than the global average at 2.7 per cent compared with 2.6 per cent in 2012. The majority of revenue was from mobile voice and data services. Jordan, Morocco and Tunisia had the highest revenue, while rates in Qatar and the United Arab Emirates were relatively low because of their high GDP.

Between 2011 and 2012, telecommunication revenues fell in Bahrain, Jordan and the Sudan, thus reducing their GDP contributions. Nevertheless, Jordan remained at the top of the list in 2012 (5.4 per cent), followed by Morocco (4.3 per cent) and Tunisia (3.9 per cent). In 2013, Saudi Arabia made $20 million in revenue from all available telecommunications services, according to the Global ICT Development Index, followed by the Syrian Arab Republic with $10.47 million and the United Arab Emirates with $8.83 million. Bahrain and the Sudan received the least revenue from telecommunications services, totalling $1.25 million and $1 million, respectively.[5]

Table 9.3 shows developments in telecommunications investment in selected Arab countries with available data, and indicates that the largest investments were in Egypt and Saudi Arabia. Political instability in some Arab countries, such as the Syrian Arab

Table 9.2. Telecom sector contributions to GDP in selected Arab countries (%), 2008-2012[a]

Country	2008	2009	2010	2011	2012
Algeria	2.70	2.50	3.60	3.00	2.90
Bahrain	4.10	4.10	4.40	4.20	3.60
Egypt	3.70	3.70	3.20	2.90	2.80
Jordan	6.70	6.30	5.90	5.80	5.40
Kuwait	3.50	3.50	..	..	..
Lebanon	7.90	7.90	..	..	..
Morocco	5.10	5.10	4.70	4.60	4.30
Oman	3.40	2.50	3.50	2.50	2.40
Qatar	1.80	1.70	1.60	1.10	1.10
Saudi Arabia	2.70	2.70	3.80	3.00	2.70
Sudan	3.30	3.20	3.20	3.10	2.10
Syrian Arab Republic	3.00	3.00	[b]..	3.10	..
Tunisia	4.30	4.30	3.90	3.90	3.90
United Arab Emirates	3.10	3.10	3.60	2.10	2.00
Yemen	1.20	1.20	3.30	3.30	3.40
MENA average	3.10	3.10		3.30	2.70
Global average	3.20	3.10	2.70	3.40	2.60

Source: World Bank (2014), *The Little Data Book on Information and Communication Technology*. http://data.worldbank.org/products/data-books/little-data-book-on-info-communication-tech.

Notes: (a) Data are the most recent.

(b) The source shows that ICT contributions to GDP in the Syrian Arab Republic reached 11.7 per cent in 2010, which is considerably high compared with other countries. Given that this rate may be cumulative, it has been omitted from the table for comparative reasons.

(..) indicate data are unavailable.

Table 9.3. Telecom sector investments in selected Arab countries (in millions of United States dollars)

Country	2003	2007	2009	2011	2013
Algeria	520	561	398	214	609
Egypt	120	1908	1791	980	685
Iraq	420	3700	447	386	661
Jordan	146	30.7	164	295	107
Kuwait	..	..	346	..	..
Morocco	100	716	240	802.7	441
Oman	131	617	397	..	..
Palestine	7	..	597	56	34
Saudi Arabia	..	..	10561	..	..
Sudan	..	478	357	382	208
Syrian Arab Republic	71	59.3	108	75	87
Tunisia	..	76	287	181	130
Yemen	40	21	50	365	..

Source: http://data.worldbank.org/indicator/IE.PPI.TELE.CD, excluding data for Kuwait, Oman and Saudi Arabia available from ITU, World Telecommunication/ICT Indicators Database 2011.

Note: (..) indicate data are unavailable.

Republic and Tunisia, might have affected investments therein. In general, investments in the sector are relatively low, especially given the importance of telecommunications in building the information society. Since 2005, GCC countries have begun investing in other countries in telecommunications operations, mainly in mobile services, and in Internet service provision, after receiving the required licences.

2. ICT imports and exports

The indicators on the export and import of ICT goods and services of the World Bank monitor the sector's contribution to the national economy. ICT goods include various electronic mechanisms and components, excluding software. ICT services include voice and data services.[6]

Table 9.4 sets out imports and exports of ICT goods and services[7] in selected Arab countries for the period 2007-2013, showing humble results for nearly all countries, thus reflecting the sector's weak export infrastructure – overall, the region is an importer of ICT goods. Re-exports in most countries come under total exports, which may explain the relatively high rates of exported goods in Tunisia and the United Arab Emirates that are regionally positioned to distribute ICT products. Service exports are relatively higher because of efforts by some countries in the field of ICT services; Kuwait and Lebanon are at the forefront in that regard.

Over the period 2011-2013, Kuwait, Palestine and Yemen achieved the highest growth in ICT service exports, rising from 35.68 per cent of total service exports to 57.32 per cent in Kuwait, from 4.35 per cent to 18.17 per cent in Palestine, and from 10.27 per cent to 22 per cent in Yemen; while Bahrain, Lebanon, Oman and Tunisia recorded drops in service export rates.

Regarding the export of ICT goods, rates dropped in Jordan, Lebanon, Morocco, Oman, Palestine and Tunisia over the period 2012-2013, but rose slightly in Egypt and Saudi Arabia. Many Arab countries, such as Algeria and Lebanon, registered meagre increases in ICT import rates; whereas other countries, such as Oman, Morocco and Tunisia, witnessed small drops in import rates.

3. Employment in the ICT sector

ITU provides a database of fulltime employment in the ICT sector. However, the data does not accurately reflect reality, because they include only employees who work directly for telecommunications operators and service providers without taking into account numerous other jobs related to telecommunications service development and distribution, such as pre-paid cards. According to these data, the number of fulltime employees in the ICT sector in the region reached 170,000 in 2010, with no significant growth compared with 2009. Egypt leads with 66,000 fulltime staff, followed by Saudi Arabia with only 23,000, Iraq with 17,000 and Morocco with 13,000.

C. Role of research, development and innovation in the ICT sector

In 2013, ESCWA conducted a study that highlighted the importance of innovation in the ICT sector, entitled "Competitiveness of the ICT sector in the Arab region: innovation and investment imperatives".[8] The study concluded that the region lagged behind in research, development and innovation activities, especially in the ICT sector, for many reasons including: a lack of researchers and developers as a percentage of the population, which is the lowest in the world; and a shortage of necessary investments in research and development. Indicators show that innovation levels in the region are low – the regional innovation index was 6.14[9] compared with a global average of 7.72. Box 9.2 gives an overview of research and development activities in selected Arab countries. The present study is based on a previous ESCWA study, published in 2011,

Table 9.4. Imports and exports of ICT goods and services in selected Arab countries

	Goods								Services			
	ICT exports (% of total goods exports)				ICT imports (% of total goods imports)				ICT exports (% of total service exports)			
Country	2007	2009	2011	2013	2007	2009	2011	2013	2007	2009	2011	2013
Algeria	0.00	0.00	0.00	0.00	4.60	3.72	3.35	4.15	39.51	44.28	61.48	60.46
Bahrain	0.06	0.39	0.57	..	1.39	2.81	3.34	..	23.11	24.23	27.97	21.63
Egypt	0.03	0.17	0.23	0.42	4.29	3.23	3.54	3.55	10.24	13.01	7.04	..
Iraq	..	..	..	..	..	..	..	..	5.01	2.90	4.36	..
Jordan	6.88	1.56	1.47	1.39	7.90	4.64	4.09	3.45	..	..	..	..
Kuwait	0.16	0.29	..	0.05	5.03	..	..	6.84	52.16	59.52	35.68	57.32
Lebanon	1.22	2.86	0.95	0.86	3.01	3.19	2.34	3.14	51.56	55.36	48.13	34.75
Libya	..	..	..	..	4.83	4.51	..	..	..	..	..	..
Morocco	5.13	4.12	3.26	2.87	6.13	5.36	4.78	3.61	17.17	19.06	20.11	22.68
Oman	0.28	0.28	0.14	0.09	3.30	2.24	2.91	2.38	38.02	21.35	22.66	15.24
Palestine	0.54	0.88	1.00	0.58	2.34	3.21	3.11	2.58	26.19	15.49	4.35	18.17
Qatar	0.04	0.04	0.02	..	3.34	..	..	5.57	..	..	..	..
Saudi Arabia	0.08	0.07	0.11	0.22	6.71	4.62	7.99	7.41	48.38	2.68	2.92	3.26
Sudan	..	0.03	0.01	..	7.5	3.33	3.68	..	6.31	7.22	6.32	7.39
Syrian Arab Republic	0.00	0.01	..	..	1.57	1.49	..	..	8.26	4.50	..	..
Tunisia	3.14	4.66	7.38	5.85	4.32	5.97	6.63	4.96	5.66	7.29	10.76	10.53
United Arab Emirates	2.72	..	..	..	4.96	..	..	..	..	..	..	..
Yemen	0.05	0.05	0.01	0.01	2.89	1.98	0.99	1.16	14.89	8.63	10.27	22.00
MENA average	1	1	0	..	5	..	..	..	30	26	..	..
Global average	12	11	10	10	12	12	11	11	28	30	30	31

Source: http://databank.worldbank.org/data/AjaxDownload/FileDownloadHandler.ashx?filename=Data_Extract_From_World_Development_Indicators.xlsx&filetype=EXCEL&language=en.
Note: (..) indicate data are unavailable.

entitled "Promoting the ICT sector to meet the challenges of the knowledge economy".[10] It highlighted the status of the ICT sector in the region by setting out national strategies of member States and the results of an ESCWA survey targeting private sector actors. The study concluded with a set of proposals on the role of Governments in strengthening the ICT sector.

D. Maturity levels in building the ICT sector in selected Arab countries

Arab countries can be divided into the following four categories (table 9.5), according to maturity levels in building the ICT sector:

Maturity level 1: countries with weak investments in the ICT sector, and few government facilities in that regard.

Maturity level 2: countries with broad telecommunications and e-government services, but with limited investments and government incentives to drive technological innovation and the ICT market.

Maturity level 3: countries with policies to strengthen the ICT sector and support its contributions to the national economy, and with an enabling environment to promote sector growth and investment.

Box 9.2. Research, development and innovating activities in selected Arab countries

- Oman: The Research Council implements several initiatives to support research and development activities, such as small and medium research scholarships for researchers in academic institutions in the country. To date, 16 ICT research projects have been funded through these scholarships, totalling around 1.1 million Omani Riyal and resulting in 99 research publications.
- Egypt: The Ministry of Communications and Information Technology has established the Technology Innovation and Entrepreneurship Centre under its initiative to support entrepreneurship and innovation. The Centre implements a number of programmes to expedite the development of policies and to create an enabling environment for ICT entrepreneurship and innovation and for capacity-building and cooperation.
- Jordan: Most research and development activities are carried out in higher education institutions and private and public research centres, and are funded by various national entities and agencies, including universities. Institutions include the Royal Scientific Society, the Scientific Research Support Fund, the Higher Council for Science and Technology, the King Abdullah II Fund for Development, the King Abdullah II Design and Development Bureau and various business incubators. Research and development activities are funded by national and international sources, such as the European Commission. The Higher Council for Science and Technology developed the national science, technology and innovation strategy 2013-2017.
- Kuwait: The Regional Centre for Development of Educational Software, following an agreement with the Arab Fund for Economic and Social Development, has undertaken several research and development activities that entail developing educational e-content, in collaboration with the Ministry of Education. The software includes science and mathematics curriculums for middle school students.
- Tunisia: the national strategic plan, known as Digital Tunisia 2018, includes a pillar on developing research, strengthening relations with industry and promoting innovation. The initiative to establish technology parks for higher education institutions and research centres is a key mechanism to facilitate open scientific research and technological development for the industrial, economic and private sectors.

Source: National surveys conducted by ESCWA in 2015.

Maturity level 4: absent in the Arab region.

The ICT sector has not registered any notable improvements over the last two years, partly because of general instability in the region.

E. Comparative performance of the Arab region

The ICT sector in the Arab region is characterized by more consumption than production. It relies on telecommunications, especially mobile telephone and Internet services, with meagre contributions from software and professional services. Consequently, the ICT sector has not gained significant added value to drive its competitiveness.

The development of the ICT sector has been hampered because it never gained a firm footing in the economic systems of Arab countries, even in GCC countries.

Table 9.5. Maturity levels in building the ICT sector in selected Arab countries

Country	2003	2005	2009	2011	2013	2015
Bahrain	1	1	2	2	2	2
Egypt	2	2	3	3	3	3
Iraq	1	1	1	1	1	1
Jordan	2	3	3	3	3	3
Kuwait	1	1	2	2	2	2
Lebanon	2	2	2	2	2	2
Libya	-	-	-	-	1	1
Morocco	-	-	-	-	2	2
Oman	1	1	2	2	2	2
Palestine	1	1	1	1	1	1
Qatar	1	1	2	2	2	2
Saudi Arabia	2	2	3	3	3	3
Sudan	-	-	1	1	1	1
Syrian Arab Republic	1	1	1	1	1	1
Tunisia	-	-	-	-	3	2
United Arab Emirates	3	3	3	3	3	3
Yemen	1	1	1	1	1	1
Regional average	1.5	1.5	1.9	1.9	1.9	1.9

Source: ESCWA.
Note: Data do not cover Libya, Morocco and Tunisia prior to 2011, because they joined ESCWA in 2012.

Investments are mainly concentrated in telecommunications, especially mobile telephones, rather than in long-term projects to develop the ICT sector.

Despite the global economic downturn, the ICT sector is expected to have a bright future given its promising growth prospects, especially if oil-producing countries reduce their dependence on oil and invest in building the sector.

F. Conclusion

The Arab region has several strengths and weaknesses in terms of building the ICT sector.

1. Strengths

- High telecommunications revenue as a percentage of GDP, provided that prices do not rise compared with purchasing power
- Participation of technology zones and business incubators in increasing the number of ICT companies and facilitating the establishment of startups, especially small and medium enterprises
- GCC countries investing abroad in ICT operations and Internet service provision.

2. Weaknesses

- Weak ICT sector efficiency, especially software and IT companies, from an economic perspective; in addition to significantly high import rates and low export rates
- Minimal government facilities and incentives, such as tax cuts and affordable bank loans; weak funding mechanisms; absence of a strong business enabling environment; and shortfalls in developing the sector's infrastructure and

organizational structure
- Relatively weak investments in the sector
- Limited research, development and innovation activities.

3. Recommendations

- Develop the ICT sector as a key tool for moving towards a knowledge-based society in the Arab region, by establishing the necessary legislative frameworks and promoting research and development
- Establish legal and regulatory frameworks for building the ICT sector
- Create an enabling environment for business in the ICT sector by encouraging investment, facilitating funding and providing tax incentives
- Promote investments in research, development and innovation
- Strengthen regional cooperation and technology transfer between ICT research institutions.

ESCWA participated in the development of regional strategies and action plans in preparation for the World Summit on the Information Society that resulted in various regional initiatives and projects, many of which have contributed to the development of the Arab information society.

10. Regional cooperation in building the information society

Undoubtedly, regional cooperation in building the information and knowledge society will lead to greater Arab integration. This collaborative effort brings together the League of Arab States, represented by the Arab Telecommunication and Information Council of Ministers (ATICM); ESCWA; ITU, represented by its Arab Regional Office; the Arab Information and Communication Technologies Organization (AICTO); and other regional bodies. The implementation of joint initiatives and exchange of practical experiences between Arab countries helps to strengthen ties between them and to develop the infrastructure needed to build information and knowledge societies, which in the end will make it possible to achieve Arab economic integration. Such cooperation also opens up opportunities for joint projects between oil-rich Arab countries (GCC countries, Iraq and Libya) and those endowed with the human resources needed for development.

Between 2003 and 2007, strategies and regional action plans were launched in preparation for WSIS, which was held in two phases (in Geneva in 2003 and Tunis in 2005), and to implement its decisions. A range of different regional and subregional projects emerged as a result, and although some faltered in the face of difficulties, others are still running today. The regional nature of those initiatives was reflected in that they were not confined to any one Arab country and that the region as a whole benefited from them. Their effective implementation requires the cooperation of all stakeholders at the regional and, on occasion, the national levels. The present chapter sets out the most important regional initiatives and activities carried out in the region in the context of the WSIS outcomes.

A. Regional Plan of Action for Building the Information Society[1]

In 2004, ESCWA, in cooperation with national stakeholders, regional and international organizations, private sector companies and other entities, launched the Regional Plan of Action for Building the Information Society in the run-up to WSIS. The Plan was multilayered to lend it the necessary flexibility and extensibility. Its aim was to develop programmes for creating solid foundations towards a sustainable information society. Each programme had a coordinating institution to ensure the compatibility and consistency of its various components, which were well-defined projects. Each of the projects had a lead coordination agency, partners, implementing institutions and beneficiaries. Projects were launched once proposals were ripe, partners had been identified and their areas of responsibility defined. The Plan comprised 10 programmes linked to WSIS action plans:

a. ICT for economic development;
b. Developing e-government services;
c. Empowering Arab non-governmental organizations in the information society;
d. Developing telecommunications infrastructure;
e. Developing the ICT sector;
f. Women's empowerment in the information society;
g. Information society measurements;
h. Promoting DAC;
i. ICT in education and scientific research;
j. Increasing community access to the ICT

sector with emphasis on the marginalized and persons with disabilities.

In all, the programmes consisted of 38 regional projects. The Plan also involved promoting cooperation between private sector actors and international and regional organizations. ESCWA began to monitor implementation of the Plan in 2006.

B. Arab Telecommunications and Information Strategy: Building the Knowledge Society

The 2001 Summit of the League of Arab States, held in Amman, adopted the Arab Telecommunications and Information Strategy as a key tool for social and economic development. In the light of regional and international developments regarding the information society, and in particular the WSIS outcomes, ATICM committees and working groups began work in 2006 on a new strategic framework. They were joined by a number of international and regional organizations, including the Arab Regional Office of the ITU and ESCWA.

In 2007, the Arab ICT Strategy: Building the Knowledge Society 2007-2012 was drafted. It envisaged achieving an integrated Arab knowledge society by making full use of ICTs and building up the ICT industry in the region to promote sustainable social and economic growth.

The strategy included the following goals and action lines:

Strategic goal 1: creating a competitive market for the Arab information society, as part of the global information society. This goal encompasses four action lines: ICT infrastructure; digital Arabic content industry and services; ICT services; creation of a secure ICT environment and building trust.

Strategic goal 2: universal access to ICTs and their use to improve the quality of services provided to the public. This goal has six action lines: access to information; capacity-building through e-learning and training; the development of e-government services; the use of ICTs to develop health services; e-business development; and the upgrade of postal institutions.

Strategic goal 3: developing an ICT industry with the aim of generating new job opportunities and quality products and services for export on the world market. This goal comprises three action lines: ICT research, development and innovation; the growth of small and medium-sized enterprises and support mechanisms for them; training of personnel with the necessary skills to build up the ICT sector.

Upon their approval by ATICM, the strategy and its accompanying plan of action were adopted at the 2008 Summit of the League of Arab States. ATICM then put together a list of projects to implement the strategy, selected from a broad range of proposals made by member States and the international and regional organizations concerned in two separate phases. The finalized list of approved projects for 2009-2010 was as follows:

a. Translating into Arabic and standardizing ICT terminology;
b. Linking Arab online networks together through universal access points;
c. Setting up the Memory of the Arab World;
d. Developing ICT indicators and the means for measuring them;
e. Creating an Arab ICT regulatory framework;
f. Designing an Internet safety project for young people in the Arab region;
g. Creating a web portal for e-learning;
h. Creating a disaster risk reduction web portal;
i. Promoting development of the digital

Arabic content industry through ICT incubators;

j. Creating an Arab public key infrastructure forum;

k. Using Arabic script in domain names and addresses.

The first five of these projects were part of a series of regional initiatives undertaken by the Arab Regional Office of the ITU to implement the WSIS outcomes. The League of Arab States adopted many of the planning processes and initiatives proposed in the ESCWA Regional Plan of Action, which were also supported by ATICM.[2] ESCWA also took part in drafting the Arab Telecommunications and Information Strategy: Building the Knowledge Society 2007-2012.

C. Regional initiatives for implementing the WSIS outcomes

1. Regional follow-up activities to WSIS

In the run-up to WSIS, ESCWA organized the Western Asia Preparatory Conference for the World Summit on the Information Society, held in Beirut from 4 to 6 February 2003, under the auspices of the Lebanese Government. The Conference resulted in the Beirut Declaration, which constituted the region's primary contribution to preparations for the Summit.

As part of preparations for the second phase of WSIS, ESCWA also organized the Second Western Asia Preparatory Conference for the World Summit on the Information Society, held in Damascus on 22 and 23 November 2004 and sponsored by the Government of the Syrian Arab Republic. The Conference resulted in a regional plan of action on issues regarding the development of the information society in the Arab region and the Damascus Proclamation: Towards Partnership for Building the Arab Information Society, which set forth the strategic support required to lay its foundations and carry out the relevant projects.

ESCWA subsequently organized a conference on Regional Follow-up to the Outcome of the World Summit on the Information Society, held in Damascus from 16 to 18 June 2009, under the auspices of the Government of the Syrian Arab Republic, and in conjunction with the two main coordinators of WSIS, ITU and UNESCO, in which other leading regional and international organizations also took part.[3] It resulted in the updating of the Regional Plan of Action for Building the Information Society, the launching of the Global Alliance for ICT and Development Regional Arab Network and adoption of the Damascus Proclamation for the Promotion of the Arab Knowledge Society for Sustainable Economic and Social Development.[4]

2. Regional digital Arabic content initiatives

The presence of national languages, including Arabic, online is essential for building a knowledge-based economy and creating ICT investment opportunities. ESCWA therefore launched its regional Digital Arabic Content Initiative in 2003, which resulted in a series of activities, including studies entitled "Enhancing Arabic content on digital networks" (2003) and "Opportunities, priorities and challenges regarding digital Arabic content" (2005).

Between 2008 and 2010, ESCWA ran a project to promote the production of DAC through technology incubators. In 2012, it launched a new phase of the project aimed at encouraging young entrepreneurs to create new small and medium digital enterprises.[5] In 2013, the Commission joined selected incubators in Arab countries to organize a series of national digital content competitions for entrepreneurs and university graduates, keen to produce new applications and programmes to support DAC. It also

established partnerships with national business incubators, enterprise and innovation centres, and universities in participating Arab countries. Participants included the Palestinian Information and Communications Technology Incubator, innovation centres in Jordan, the Technology Innovation and Entrepreneurship Centre in Egypt, the Elgazala Technopark in Tunisia, and Syrian Computer Society ICT incubators, Berytech in Lebanon, the University of Aden in Yemen, and the United Arab Emirates University in Abu Dhabi. They in turn teamed up with local partners to implement multi-stakeholder initiatives.

The issue of DAC has awakened considerable interest in recent years, with various national and regional bodies stepping up efforts to promote, improve and develop it. An example is the annual regional digital Arabic content forum, a joint initiative of ESCWA, the Egyptian Ministry of Communications and Information Technology, and the Arab Regional Office of ITU, under the auspices of the League of Arab States.[6] It was held for the first time in Cairo in 2013 on the theme "Digital content that fosters transparency, participation and innovation in the Arab region". In 2014, the theme of the forum, again held in Cairo, was "Development impact of the digital Arabic content industry". The theme of the third forum, staged in Dubai in 2015, was "Digital Arabic content in an era of major digital transformation". The forum produced a long list of recommendations on how to develop the industry and proposals for a more formally organized structure for the forum and operative mechanisms. A draft proposal was presented to ATICM that, at its eighteenth session (Cairo, December 2014), urged Arab administrations to intensify their involvement in regional forums and coordination with the Council of Arab Information Ministers of the League of Arab States and information ministries, with a view to taking a more active part in the work of the forum, launching digital Arabic content projects and boosting online content.[7]

Other examples of regional cooperation in this area include:

- The ITU Connect Arab Summit, held in Doha in 2012, at which digital Arabic content was declared a top priority in the Arab region
- A series of national initiatives with regional impact, including the King Abdullah Initiative for Arabic Content in Saudi Arabia[8] and Arabic-language initiatives in the United Arab Emirates[9]
- Community stakeholder partnerships such as Taghreedat and its extensive partner network[10]
- Specific DAC applications and products in the private sector and in the framework of entrepreneurship support platforms, such as Arabnet[11] and the Wamda platform.[12]

3. Harmonizing cyberlegislation to develop the knowledge society in the Arab region

Between 2009 and 2012, ESCWA carried out a project on regional harmonization of cyberlegislation to promote the knowledge society in the Arab region,[13] and enhance regional integration and strengthen the capacity of member States to develop and adopt integrated cyberlegislation. The project was launched at a time when Arab States were in the process of modernizing their legal and regulatory frameworks to take into account the spread of ICT in various fields and the growing role that cyberspace plays in daily life. A series of activities was undertaken in the context of the project, including national and regional capacity-building workshops tailored to local needs, expert meetings and seminars. Advisory services reflecting local needs were also provided to 10 Arab countries. Their impact was noteworthy, since they required close cooperation between government institutions, such as ministries of justice and ministries and other bodies responsible for ICT. In particular, ESCWA co-hosted workshops with local partners in Algeria, Bahrain, the Sudan and the United Arab Emirates, and

provided advisory services to Algeria, Bahrain, Iraq, Libya, Oman, Palestine, the Sudan and the Syrian Arab Republic. The scope of those initiatives was not confined to the examination of a particular law in each country, but rather studied a broad range of legislation. The countries concerned were given feedback identifying gaps in the law and ways of addressing them. In some cases, suggested draft legislation was provided.

A key outcome of the project was the ESCWA Cyber Legislation Directives,[14] based on research on, and interpretations and models of, cyberlegislation in the following areas: electronic communication and freedom of expression; e-signatures and e-transactions; e-commerce and consumer protection; personal data protection; cybercrime; and intellectual property in cyberspace. The Directives were addressed to Governments and decision-makers in Arab countries, and to legal experts, including lawyers, judges and academics. Cooperation with qualified legal experts and extensive research into key experiences in the region were indispensable to the drafting of the Directives. Major reference sources, such as research by the European Union and other regional and international references, were adapted to the specific needs of the Arab region. ESCWA conducted an assessment of cyberlegislation in 18 Arab countries and produced four reports and six templates summarizing the current situation in comparison with its earlier cyberlegislation model.[15]

Cooperation with regional and national organizations was essential for carrying out the project. The League of Arab States, in particular, lobbied to have the Directives adopted at the ministerial level and its Council of Arab Justice Ministers recommended, at its twenty-seventh session (Cairo, 2012), maintaining cooperation between the Office of the Executive Council and ESCWA on the development and harmonization of cyberlegislation in the region. A steering committee was set up to establish a general brief and expectations for the project. Its membership reflected existing cooperation at the regional and international levels. Membership of the steering committee was composed of the Council of Arab Justice Ministers, ITU, the Arab Administrative Development Organization and the Economic Commission for Africa. The project offered opportunities for joint initiatives with United Nations sister organizations, such as the United Nations Office on Drugs and Crime (UNODC), in the areas of cyber legislation and cybercrime.

With a view to garnering more international support for the project and making the Arab experience known to a global audience, ESCWA produced an English-language cyberlegislation digest containing a summary of the project's activities and results, and a review of the cyberlegislation directives presented therein.[16] In 2013, it released a policy note regarding the development and harmonization of cyberlegislation in Arab countries.[17] Given the crucial importance of combating cybercrime to build trust in cyberspace, ESCWA prepared a study in 2015 on cybersecurity and combating cybercrime in the region that included a policy, regulatory and procedural framework for curbing such criminal activities.[18]

4. Networking science, technology and innovation in the Arab region

The ESCWA Technology Centre was founded, after years of groundwork, in 2011 and is hosted in Al-Hassan Science City in Amman, under the auspices of ESCWA, the Royal Scientific Society and the Jordanian Higher Council for Science and Technology. Its primary goals are to promote greater coordination between national centres of scientific, technological and innovation (STI) excellence in the region, to create links between them and to foster technology transfer between ESCWA member States

so as to avoid duplication of efforts and to identify gaps in the STI fabric at the regional level. The Centre has a mandate to enhance regional synergies and integration in the use of technology by relevant institutions and stakeholders in ESCWA member States. Among its achievements to date are:

- The preparation of a an analytical study on strengths, challenges, opportunities and dangers with regard to STI in the region, with a view to building regional partnerships and formulating appropriate strategies
- The provision of technical advisory services to various research institutes in the region aspiring to create a technology transfer centre, among them the King Abdullah City for Atomic and Renewable Energy in Saudi Arabia and the Université Sidi Mohamed Ben Abdellah in Fez, Morocco
- The organization of marketing tours aimed at bringing together local specialized small and medium-sized businesses with consultants in Egypt, Jordan, Lebanon and Palestine, conducted in conjunction with the King Hussein Business Park and the Licensing Executives Society – Arab Countries. The tours resulted in 11 regional work projects
- The launch of a project in support of a regional technology transfer centre in 2015
- The preparation of STI maps for the Arab region.

5. Academy of ICT Essentials for Government Leaders in the ESCWA region

The decision to fund the Academy of ICT Essentials for Government Leaders in the ESCWA Region (AIGLE)[19] from the United Nations Development Account was taken in 2011. ESCWA began implementing the project, planned over three years, in February 2013, with the aim of training Government leaders in the ESCWA region in ICT for development. It was inspired by the achievements of the United Nations Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT). The Academy aims to build the capacity of Governments in ESCWA member States to pave the way for transition to the knowledge economy and to ensure its sustainability.

Several institutions were selected from the outset as prospective partners in the project's various stages, and a needs assessment was completed jointly with them by means of a regional survey using a questionnaire specifically designed with the goals of that assessment in mind. Analysis of the responses of the 1,540 participants in the survey showed that the overwhelming majority clearly felt the need for training, especially in view of the growing use of ICT applications in all government institutions and the need for decision-makers to be kept abreast of the development aspects of ICT. The six training module subjects most highly rated by survey participants were e-government applications; the link between ICT applications and development; ICT for development policies and governance; Internet governance and management; information safety and privacy; and the management of ICT for development projects.

It was subsequently decided for the purposes of the project to focus on the first four subjects, leaving consideration of the others to a later date. Each subject was assigned to an expert tasked with preparing a training manual thereon. A fifth expert was designated as coordinator. The experts took as their starting point the training manuals on their respective subjects available at APCICT, researching their contents and analysing their basic concepts so as to tailor them to the needs of the Arab region. They examined case studies and similar sources available in the region for use in their training materials, thereby enhancing their usefulness to trainees.

To finalize the training module manuals[20] and in compliance with the project plan, ESCWA organized two regional workshops to train trainers, attended by 105 participants, of whom 88 were training module instructors. A large number of experts, who contributed to preparing the modules and reviewing their content with national coordinators from 14 Arab countries involved in the project, also attended. In the framework of cooperation between ESCWA and its main partners in countries taking part in the project, national training plans were put together in 10 countries for the years 2015 and 2016, aimed especially at training more than 6,000 senior civil servants. National training courses were organized in some of those countries and, in coordination with ESCWA, several academic institutions began to incorporate the units into their curriculums. A virtual training platform has been developed, which provides training content for all interested parties and stakeholders in the Academy through online study sessions, presentations and videos. It also provides experts with a forum for dialogue, discussion and the exchange of experiences and ideas, and an opportunity to develop an observatory to study cases from around the Arab region and flag new cases from countries participating in the Academy. ESCWA is monitoring implementation of the project and the setting up of cooperative partnerships with public administration stakeholders, including government bodies and academic institutions responsible for training at the national level. The Commission is also providing advisory services. In 2015, it conducted nine advisory missions in six Arab countries.

6. Child online protection

ITU launched the Child Online Protection Initiative (COP)[21] in 2008 within the Global Cybersecurity Agenda framework. Its key objectives are to identify risks and vulnerabilities to children in cyberspace; increase awareness of those risks through a range of media; develop practical tools to help Governments, organizations and educators to minimize risks; share knowledge and experience, and work towards the creation of strategic international partnerships to implement practical initiatives.

As a practical step to help countries start creating a cyberworld that is safe for children, ITU issued a series of studies and guidelines on child online protection in the six official United Nations languages for children; parents, guardians and teachers; industry; and policymakers. The Arab Regional Office of the ITU has organized various regional workshops focusing on assessing the current situation, legal considerations, the role of online service providers, and how to develop a regional legal COP framework. It also set up an Arab working group to develop guidelines for such a framework, with representatives from Algeria, Bahrain, Egypt, Iraq, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Tunisia and Yemen, as well as from regional and civil society organizations.

The group worked on a general framework for the development of guidelines for policymakers and drafted model legislation. It also made a series of recommendations regarding legislative, regulatory, technical and operational issues, and on capacity-building in the area of child online protection.

ITU is compiling country profiles on the subject with a view to sharing best practices among Arab countries and developing appropriate policies. Profiles on all Arab countries excluding Palestine are being disseminated.[22] Egypt has provided the best example of an Arabic-language online safety portal (the Amanak portal) in terms of design and implementation.[23]

7. Translation of ICT terminology into Arabic

The aim of this project is to develop an Arabic-English-French glossary of ICT terms as a tool

for standardizing terminology used in the Arab region. The Ministry of Communications and Technology of the Syrian Arab Republic was the ITU lead partner in rolling out the project.

Several attempts have been made in the past to translate ICT terms into Arabic and to produce bi- and tri-lingual e-glossaries (English-French-Arabic). In 2006, a project for the translation and Arabization of ICT terminology approved by ATICM the previous year was introduced at the World Telecommunication Development Conference held in Doha, with a view to attracting funding for it.[24] The Conference called upon the ITU Telecommunications Development Bureau to implement the initiative jointly with the League of Arab States and Arab countries.

The first Coordination and Follow-up Meeting for the Translation and Arabization of ICT Terminology took place in Damascus on 18 and 19 October 2008. It attracted experts from seven ESCWA member States (Egypt, Kuwait, Oman, Saudi Arabia, the Sudan, the Syrian Arab Republic and Yemen) and representatives from the League of Arab States, the World Health Organization Regional Office for the Eastern Mediterranean, the Arab League Educational, Cultural and Scientific Organization (ALECSO), ESCWA, the Islamic Educational, Scientific and Cultural Organization (ISESCO) and the Arab States Broadcasting Union. The goal of the initiative was to consolidate efforts made to translate ICT terminology and to set up a trilingual electronic dictionary (Arabic, English and French), to be made available online, in print and on CD-ROM.[25]

It was agreed to update the planned e-glossary and use it to compile an Arabic-English-French dictionary in online, CD-ROM and print versions. Joint implementation of the project by ITU and the Government of the Syrian Arab Republic, represented by the Ministry of Communications and Technology and the Syrian Scientific Society for Informatics, began in April 2009 and was due for completion by the end of 2011. Reports by ITU indicate that the project was brought to a halt by the security and political situation in the Syrian Arab Republic. However, the Syrian Scientific Society for Informatics continued to work alone and brought out an Arabic-English dictionary of ICT terminology.

8. Memory of the Arab World

The Memory of the Arab World[26] project was a joint Arab initiative launched by the Arab Regional Office of the ITU in mid-2007, with the aim of using ICT to maintain and document Arab heritage. All Arab States were involved, together with the League of Arab States, UNESCO, ALECSO and ISESCO. The Egyptian Ministry of Communications and Information Technology provided technical support for the project through the Centre for Documentation of Cultural and Natural Heritage. As it proceeded, Arab countries took part in various regional workshops to discuss implementation mechanisms and lines of action.

The first phase was completed in July 2011, generating a wealth of valuable material on six subject areas covering aspects of Arab culture, architecture and history. A bilingual portal was developed as a result, along with a set of bibliographies on CD. In some participating countries, heritage documentation efforts are ongoing, as exemplified by the work of the Centre for Documentation of Cultural and Natural Heritage in Egypt. The launch of the project's second phase was announced at the ITU Connect Arab Summit in 2012,[27] but was unable to go ahead due to the prevailing security situation in some of the participating countries.

9. Arab Internet Governance Forum

Given that insufficient attention had been paid to issues of Internet governance during the two phases of WSIS, the Secretariat of the United Nations set up the Internet Governance Forum

as a global platform involving stakeholders from Governments, the private sector, civil society, international organizations and academic institutions to discuss global policy on the subject. Its initial five-year mandate (2006-2010) was renewed for a further five years (2011-2015).

In this context, ESCWA worked closely with the League of Arab States to launch a study entitled "Internet Governance: Challenges and Opportunities for the ESCWA Member Countries" at the fourth meeting of the Internet Governance Forum, held in Sharm el-Sheikh, Egypt, in 2009. This bilateral cooperation then fed into the regional Arab Dialogue on Internet Governance initiative, aimed at encouraging discussion on the subject among various stakeholders. Two documents were published in Beirut in 2011 as a result, a joint paper by ESCWA and the League of Arab States entitled Arab Regional Roadmap for Internet Governance: Framework, Principles and Objectives, and the Call of Arab Stakeholders urging the League and ESCWA to launch the process for creating an Internet governance forum in the Arab region along the lines of similar initiatives in other regions.

By 2011, more than 10 Internet governance forums had been established in Europe, Asia, Latin America and Africa. Following their example, the joint efforts of Arab stakeholders led to the establishment of the Arab Internet Governance Forum (Arab IGF) in 2012. The Forum, the initial mandate of which was set at four years, served as a decentralized platform with a bottom-up approach where all stakeholders could discuss policy.

Its main partners convened the Forum's first annual meeting in Kuwait in October 2012, attended by more than 300 participants, on the theme "A better Internet for a better Arab world". A range of Internet governance issues was discussed at the main sessions and during 12 workshops, in particular: access, openness, security, privacy, content, crucial Internet resources, and young people. The second meeting, attracting more than 800 participants, took place in Algiers in October 2013; and the third was hosted by ESCWA in Beirut in November 2014 and attended by more than 500 people. It was preceded by an introductory day on issues connected with Internet governance capacity-building and featured substantive workshops and plenary sessions on the theme "An Arab vision of the future of the Internet". The fourth meeting of the Forum was also held in Beirut, on 17 and 18 December 2015, this time under the auspices of the Lebanese Ministry of Telecommunications and on the theme "Internet economy for sustainable development". The day prior to the meeting was set aside for preliminary events focusing on Internet governance issues.

The Arab IGF, according to its founding vision, is a platform intended neither for decision-making nor the issuance of binding recommendations, but rather for open dialogue between stakeholders. Its importance resides in its capacity to facilitate the implementation of programmes under the Arab Regional Roadmap for Internet Governance, which pinpoints the needs and priorities of the Arab region in that regard. The process aims to build capacity and raise awareness of stakeholders in Arab countries on specific issues, including the exchange of data at the regional level, Arabic domain names and child online protection.

10. Arabic Domain Names System

In mid-2003, ESCWA set up the Arabic Domain Names Task Force (AND-TF). It was at the time the sole regional mechanism attempting to foster and harmonize efforts in that area. After the working group had set out a strategy for creating a comprehensive and globally interactive system capable of achieving the desired goals, ESCWA drafted the first ever document[28] on the subject and had it disseminated via the Internet Engineering Task Force (IETF) website. The draft made quite

an impact on the region, leading to renewed efforts and dynamism among Arab countries, and especially in the League of Arab States, on the theme of Arabic domain names. In 2004, the League set up its own Arabic domain names working group, which adopted the draft and forwarded it to ATICM for approval.

In early 2007, ESCWA took part in the assessment of the regional pilot project launched by the League of Arab States to create an Arabic-language domain name environment, based on technical guidance developed by ESCWA. The eight Arab countries that took part in the project soon acquired expertise in running Arabic-language domain names, and were able to identify what was required to launch them, solve technical issues, agree on criteria and standards and develop policy tools needed to manage the project.

Arabic domain names were adopted as part of the internationalized domain names in 2010, representing an important expansion of the domain names in the Arab region. By 2015, 13 ESCWA member countries had registered an Arabic top-level domain (TLD) name.

The Internet Corporation for Assigned Names and Numbers (ICANN) began to speed up the preparation of country code top-level domains (ccTLDs) via a fast track that paved the way for the effective registration and use of the ccTLDS of ESCWA member States as of 2010. At its forty-first meeting, held in June 2011, ICANN marked a turning point in Internet history with its decision to adopt a new generic top-level domain (gTLD) programme. The League of Arab States, in cooperation with ESCWA, then began to intensify its efforts to acquire the Arabic TLD ".arab" and its internationalized domain name equivalent ".عرب", and established its own record as part of the new gTLD programme.

The Arabic domain names system accommodates other applications including e-mail and file transfer protocol (FTP), which support the new domain names system or are based on it. The spread of the Internet and its growing use at the grassroots level are spurring the proliferation of DAC, while the establishment of the Arabic domain names system has acted as a catalyst for the production of content across all sectors. The cross-border provision of multimedia content plays an essential role in improving the quality of life of citizens in the Arab region.[29]

11. Knowledge networks through ICT access points for disadvantaged communities

ESCWA and other regional commissions undertook to implement the "Knowledge networks through ICT access points for disadvantaged communities" project and monitor its implementation between 2006 and 2010, with funding from the United Nations Development Account.[30] The aim of the project was to empower disadvantaged communities by converting selected access points and remote call centres into knowledge network nodes. The project worked to improve the spread, development, organization, exchange and dissemination of knowledge of sustainable development issues regarding, among other things, employment, education, women and health.

Activities undertaken at the regional level included regionwide studies, and the development of knowledge strategies, workshops and coordination meetings, all aimed at transforming the selected centres in to knowledge centres. By the end of 2010, each of the regional commissions had completed implementation of their respective activities. In ESCWA member States, four out of 14 access points were transformed into knowledge centres, while the remainder contributed to the dissemination of knowledge through a regional or global network. This network has targeted more than half a million users, 60 per cent of them women in poor areas and disadvantaged communities.

The Arab region consumes more technology than it produces. All Arab countries, to varying degrees, are facing challenges in harnessing technology and innovation to ensure sustainable economic and social development.

11. The 2030 Agenda for Sustainable Development and the knowledge society in the Arab region

Over the past 10 years, the ICT scene has changed dramatically in the Arab region, making it necessary to review the WSIS goals and their measurable indicators. The deadlines for achieving the WSIS goals were aligned with those of the Millennium Development Goals (MDGs). It may therefore be necessary to link the WSIS goals in a similar fashion to any future development framework that is adopted, particularly given the key role of ICT in the post-2015 development agenda.

The Sustainable Development Goals (SDGs), finalized by the United Nations in September 2015, will form the backbone of the global development framework until 2030. Their aim is to take up where the MDGs left off and to meet new development challenges in different countries. They embody a comprehensive set of global priorities for sustainable development with forward-looking global targets. Each Government, however, is free to determine its own national objectives, guided by the global ambition but taking into account particular local circumstances. The Goals are characterized by their practical orientation and universal nature and applicability. The Goals and targets broadly cover economic, social and environmental dimensions, and they make clear that efforts to achieve sustainable development are doomed to failure unless all those aspects are addressed holistically.

Implementation of the SDGs requires a vigorous global partnership for sustainable development between Governments, civil society, the private sector and the United Nations system. A robust mechanism to monitor implementation is essential for achieving the SDGs, and it is expected that the General Assembly, Economic and Social Council and High-level Political Forum will play a major role in that regard.

Each country bears the primary responsibility for its own economic and social development. Appropriate national policies and development strategies must be adopted and the necessary local resources mobilized to achieve the SDGs. Most Arab countries will have to mobilize considerable resources from a variety of sources and use them effectively to achieve those Goals.[1]

A. The contribution of technology and innovation to achievement of the SDGs in the Arab region

Research has shown that ICT can reinforce the three pillars of sustainable development: economic growth, social inclusion and environmental sustainability.[2] Evidence shows that effective and affordable broadband connectivity is a vital enabler of economic growth, social inclusion and environmental protection.[3] Given its capacity to facilitate the achievement of development goals, the importance of ICT and whatever is required to develop it should be highlighted in post-2015 development agendas. Innovation and technology, including ICT, can contribute effectively to achieving the SDGs in the following ways:[4]

Goal 1: End poverty in all its forms everywhere

- By making communication more affordable, ICTs help to multiply development opportunities for the poor and to empower marginalized communities;
- The deployment of broadband can have an appreciable effect on GDP growth, thereby

opening up new markets, encouraging innovation and supporting conditions of economies of scale, and by extension contributing to job creation and poverty eradication.

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

- Low agricultural productivity can be improved by using green ICT and biotechnology to rationalize water consumption, make irrigation more efficient and produce safe, effective fertilizer.

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

- Arab societies could benefit greatly from biotechnology, telemedicine and e-health, given the availability of the ICT infrastructure required for such applications;
- Computer applications can be used for the transfer of health information to health-care centres and to raise public awareness of how to prevent diseases such as AIDS;
- Knowledge platforms, and computer, online and smartphone applications can be used to monitor the health of children under 5 years of age, identify cases of malnutrition and vulnerability, and monitor their exposure to diseases and epidemics;
- Computer applications can be employed to monitor the health of pregnant women and mothers, register pregnancies, provide post-natal care, and reduce the incidence of disease transmission (such as HIV/AIDS) between mothers and newborns.

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

- ICT opens the way to distance education, to the dissemination of Arabic content to tens of millions of people who are literate only in Arabic, especially in overcrowded national schools and universities, and creates opportunities for continuing and adult education;
- The provision of high-quality educational digital content can lead to better educational performance.

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

- The use of computers can be an incentive to keep children (especially girls) in schools;
- Men and women tend to use ICT differently and so applications and digital content tailored to their respective needs can be developed;
- ICT can empower women to contribute to family upkeep and to engage in local political and economic activities, without necessarily overturning social structures or constraints that obtain in some countries.

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

- Green technologies can improve the efficiency of desalination and water distribution networks and systems, monitoring and control and sewage treatment, and reduce the cost of purifying water for drinking and agriculture.

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

- The harnessing of renewable energy sources depends on the use of new technologies and innovation, establishing where resources are located and monitoring energy efficiency in its various uses.

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

- Technology can aid educated young people in identifying economic opportunities, given that technological innovation combined with a sense of initiative enables bright local people to engage in teleworking and contributes to the global value chain;
- Technology offers great opportunities for entrepreneurship and the creation of

startups and helps to attract investment, especially in areas of high-level innovation linked to other SDGs.

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

- Innovative technology solutions and products can be developed and used to set up, monitor and maintain a range of infrastructure using local contributions and knowledge;
- Developing innovation policies in the Arab region will generate jobs, boost economic development and encourage technology transfer in line with national and regional needs;
- Developing an innovation ecosystem can help to improve value added, boost manufacturing and achieve more inclusive growth;
- Building human capacity and improving teaching methods can contribute to more innovative thinking among young people.

Goal 10: Reduce inequality within and among countries

- The spread of ICT contributes to achieving equality by empowering members of the community through equal access to information, knowledge and opportunities.

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

- Solar power is growing in importance as a source of energy for e-platforms and mobile devices, especially in remote places;
- Smart cities will make it possible to harness various technologies for the collection and analysis of data and assessment of priorities, the identification of potential challenges and adoption of the necessary measures to overcome them.

Goal 12: Ensure sustainable consumption and production patterns

- Technology will facilitate assessment of the negative impact of unsustainable consumption and production patterns.

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

- Technology and knowledge dissemination are crucial to combating climate change, together with consideration of local environmental considerations, appropriate analysis and the calibration of approaches to the environment.

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

- Arab countries need to take into hand the sustainable management of the oceans and seas on which they lie, and of their marine resources. They should spare no effort in preserving ocean and coastal marine life in the Arabian Gulf, the Red Sea, the Mediterranean, the Indian and Atlantic Oceans, and the Dead Sea, using monitoring technologies and setting up disaster response mechanisms along oil transport routes and in areas where ecosystems are fragile.

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

- Most Arab economies depend directly or indirectly on the extraction of natural resources such as phosphates, oil and gas, and other energy sources. However, biotechnology, water technology and renewable energy technologies could constitute suitable alternatives for power generation that would spare the local ecosystem.

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

- E-government, and e-governance in general, can facilitate the achievement of justice, transparency and inclusive

participation in the Arab countries, especially through the use of local content in Arabic.

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

- The private sector, working with and under the guidance of the public sector, can open up ICT markets, especially in broadband and mobile communications, thereby making the most of this technology for development;
- Implementation should be directed at real challenges on the ground through partnerships between all sectors. Arab countries can make the most of local culture and its values to conclude social contracts at the local and regional levels and to strengthen their position globally. Technology can play an enabling role in proposed partnerships and projects in support of implementation of all the SDGs.

The United Nations has established a technology facilitation mechanism to support implementation of the SDGs.[5] Under the mechanism, the United Nations Interagency Task Team on Science, Technology and Innovation for the SDGs was set up. It also provides for an annual stakeholders' SDG forum and the development of an online platform as an STI information portal. It is up to the Arab countries to make the most of the mechanism and participate fully in it.

B. Potential challenges in achieving development goals and targets in the Arabic region

Arab countries, especially non-members of the GCC, remain handicapped by a significant digital divide. They need to bridge it in order to reap the benefits of ICT and broadband and use them to transform the lives of people, especially youth, women, the poor and persons with disabilities. The nature of the divide has changed over time and has taken on multiple aspects, as shown in box 11.1. Despite the many similarities between Arab countries, the contrast in economic and social terms between GCC countries, with their abundant resources, and other Arab countries with high levels of poverty and unemployment, especially among women and youth, remains considerable. Domestic consumption of goods and services, including those related to technology, continues to exceed production in Arab countries. Moreover, some are afflicted by political crises that are holding back economic and social development. All Arab countries face, to varying degrees, difficulties in harnessing ICT for sustainable development, among the most significant of which are:

a. Limited funding earmarked for technological research, development and innovation;
b. The weakness of STI systems and lack of cooperation between universities, research and development centres and industry;
c. The dearth of qualified personnel, exacerbated by brain drain, especially in areas of ICT related to development;
d. Shortcomings in the legal and regulatory framework for technology in general, and in particular with regard to the ICT sector and cyberspace;
e. The incapacity of individuals and institutions in most Arab countries to pay for ICT equipment, including smart devices and mobile broadband communications;
f. Low broadband penetration, an incapacity to invest in it and its limited deployment in the service of sustainable development;
g. A failure to make headway in the area cybersecurity and Internet safety, and inefficient freedom of access and privacy protection systems;
h. ICT applications and services for economic and social development are used in ad hoc fashion, and the production of substantial digital content, especially in Arabic, is limited;
i. The paucity of available statistics and data

Box 11.1. Digital divide in the Arab region

The nature of the digital divide in the Arab region has changed over time and is marked by various facets:

1. The digital divide in terms of broadband connectivity, at speeds of between from 2 Mbps and 25 Mbps, versus older methods, whose speed may not exceed 54 Kbps;
2. The information divide between, on the one hand, people able to access high-quality content and effective e-services through the socially and economically effective use of ICT and, on the other hand, those who use technology purely for recreational purposes or as a tool of communication;
3. The digital divide at the subregional level, in other words the difference between the GCC countries and other Arab countries in terms of the level of ICT development;
4. The digital divide within a given country between urban and rural areas, given that people in the latter have little or no access to the Internet and e-services due to poor connectivity, its high cost or the unavailability of the appropriate devices;
5. The digital divide affecting persons with disabilities in the Arab region, especially because of the limited availability of suitable applications and equipment for them.

needed to inform ICT policy design and implementation.

C. Building a knowledge society in the context of the 2030 Agenda for Sustainable Development: prospects for the Arab region

The Arab region, together with the rest of the world, worked to agree on the SDGs for the post-2015 period in line with the global information society priorities established by the WSIS+10. The Arab countries continue to strive for an inclusive, people-centred information society, in which all can tap into the limitless possibilities offered by the use of ICTs and participate in making more sustainable economic and social development a reality. Building on a wealth of expert studies, reports and analyses, ESCWA has singled out the region's key aspirations with regard to the post-2015 development of the knowledge society:

a. Implement a regional action plan, and its concomitant national action plans, to achieve technology and innovation targets in the context of the 2030 Agenda in the Arab region, and develop integrated sectoral e-services strategies in the framework of national and regional strategies;
b. Benefit from scientific, technological and innovative capacity to produce national outputs with significant added value and to facilitate the transition to a digital and knowledge-based economy; and to earmark more efficient budgets to fund research, development and innovation in technology, especially for sustainable development;
c. Ensure cooperation and the exchange of experiences and best practices between all stakeholders in the field of technology and innovation at the national and regional levels, so as to launch transferable sustainable development projects;
d. Build ICT capacity and promote a culture of knowledge and life-long learning for all to assist users in efficiently employing new technologies and to benefit from Internet information sources;
e. Foster a legal, regulatory and investment environment conducive to the development of technology and innovation for sustainable development, and provide the

necessary funding mechanisms;

f. Expand infrastructure, especially for fixed and mobile broadband services, to bridge the digital divide; work to improve quality and communications capacity; and reduce the cost of telecommunications, especially in crisis-affected countries;
g. Ensure inclusive access to information, knowledge and ICT services; increase opportunities for women, marginalized groups and the inhabitants of remote areas to benefit from those services; and facilitate their usage by persons with special needs;
h. Promote the development of e-services, including e-learning, e-health and e-commerce; support e-government programmes and expedite their implementation, including by reviewing public institution processes so as to improve service provision to all citizens, enhance institutional transparency and efficiency, and include citizens in decision-making;
i. Make cyberspace digitally diverse in terms of culture, language, health and agriculture by encouraging more widespread use of the Internet and email, broadening the array of search engines and domain names available in non-Latin script and enriching local digital content, allowing everyone to participate in online life and in its enrichment;
j. Guarantee trust and security in ICT usage, build national and regional capacity to face cyberthreats, and provide protection to Internet users, especially children; and ensure respect for the ethical dimensions of ICT usage;

Annex II reviews in more detail the aspirations of the Arab region, and examines how they tie in with the post-2015 global information society priorities (WSIS+10) and the SDGs.

Conclusion

Since 2003, and building on the decisions and outcomes of the WSIS, ESCWA has produced numerous reports on the information society in ESCWA member countries and in the region as a whole. The aim of the series of biennial regional profiles published by ESCWA between 2003 and 2013 was to monitor and evaluate aspects of the information society in member countries and measure progress in its development. In all, ESCWA issued six such reports, corresponding to the years 2003, 2005, 2007, 2009, 2011 and 2013.[1]

This report reviews the evolution of the information society across the Arab region between 2003 and 2015, in the light of the WSIS action lines. Each chapter discusses a different aspect of progress with regard to the information society, providing objective analysis based on reliable data and statistics and presenting a range of success stories from countries around the region. Each chapter also draws comparisons between countries and between the Arab and other regions, looking at strong and weak points with regard to the action line concerned, and concludes with recommendations on how to proceed on them.

The structure of the report enables the reader to obtain an overall picture of how the information society is evolving in the Arab region, or to concentrate on a particular action line in any given chapter. Recommendations on how to develop the information society appear throughout the report's chapters in accordance with the WSIS action lines.

Worldwide initiatives such as the 2030 Agenda and the WSIS+10 targets make it incumbent on Arab countries to commit themselves to implementing global development plans and overcoming associated obstacles, by mustering the necessary political will and bringing national science and technology strategies, especially with regard to ICTs, into line with the new development goals and the region's priorities. The last chapter thus concentrates on examining key areas of overlap between information society development priorities in the region and the SDGs.

Recommendations contained in the report can be summarized as follows:

- Carry out periodic reviews of national information society visions and ICT sector strategies with a view to ensuring consistency with changing national priorities; harmonize strategies with action plans; and work with interested partners to improve their chances of success;

- Speed up the liberalization of the telecommunications sector; foster competition in subsectors; and strive to establish transparent, efficient and independent bodies with the expertise to regulate the communications sector in member countries;

- Give priority to projects for better quality and lower priced mobile and fixed broadband services; promote the creation of local and regional Internet exchange points (IXPs) in the Arab region; install fibre-optic cables as a means of improving connectivity at a lower cost;

- Adopt and implement policies and initiatives to provide universal online access, especially for women, persons with

special needs and those living in remote or marginalized areas; and pass special legislation on free access to information, especially in the public domain;

- Modernize current teaching methodologies and use e-learning tools and methods (such as through the Internet and smartphones); improve the connectivity of educational institutions; broaden the spectrum of ICT academic and vocational training programmes at all levels, updating curricula constantly in the light of technological advances;

- Build trust in cyberspace through national security strategies and clear operational action plans; bring cyberlegislation into line with international conventions and treaties, especially with regard to combating cybercrime and privacy protection; set up the necessary law enforcement agencies; and step up cooperation at the national, regional and international levels to combat cybercrime;

- Update and/or enact laws on e-transactions and e-signatures; enhance cybersecurity; close gaps in intellectual property legislation in order to cover digital content, e-publishing and related software.

- Encourage investment in ICT and the creation of venture capital funds to back ICT start-ups; foster a spirit of innovation and entrepreneurship in the ICT sector; and involve the private sector in efforts and initiatives aimed at cultivating an enabling environment;

- Earmark resources to implement and scale up e-government initiatives; provide people-centred interactive services; re-engineer the enabling environment for e-governance in order to facilitate public sector institutional links; promote coordination and coherence among government bodies; and improve access to and the provision of e-government tools at reasonable prices;

- Encourage private sector e-business and e-commerce initiatives; enable secure online payment; create national online payment portals and publicize them; and promote the establishment of a single online market for the Arab region with public and private sector involvement;

- Put in place the necessary strategies and action plans to develop e-services; enrich digital Arabic content and strengthen that sector at the national and regional levels; support all Arab cultural heritage digitization efforts; and bolster Arab cooperation by launching regional initiatives to develop digital Arabic content;

- Promote the development of the ICT sector as a key factor in the transition to the knowledge-based economy in the Arabic region by establishing the appropriate legislative and investment frameworks; stimulate research, development and innovation; and promote regional cooperation and technology transfer between institutions and ICT research teams;

- Stimulate cooperation between all stakeholders and consolidate Arab regional cooperation with a view to building the knowledge society; encourage the exchange of lessons learned and success stories and technological solutions between Arab countries; launch regional and subregional initiatives aimed at achieving sustainable economic and social growth;

- Redouble efforts to measure progress towards the realization of an information and knowledge society; develop ways and means of doing so through the Partnership on Measuring ICT for Development; motivate Governments to collect data and information,

disaggregated by sex, for use in measurable indicators;

- Advance the process of economic and social development in the Arabic region by developing national policies and strategies consistent with WSIS+10 and 2030 Development Agenda goals, and through cooperation between all stakeholders;
- Encourage Arab countries to participate in events organized at the global level in the framework of follow-up to the 2030 Agenda; boost regional cooperation with a view to implementing the Agenda; set up a platform or Web portal to keep the public abreast of progress in implementing the SDGs; and set up a regional technology bank.

Annexes

Annex I

Priority areas for implementation as outlined in the statement issued at the WSIS+10 High-level Event in 2014[1]

1	The need to protect and reinforce all human rights, and to recognize their importance to realize economic and social development, ensuring equal respect for and enforcement of all human rights online and offline.
2	Encouraging and facilitating people-centred and inclusive governance models and mechanisms.
3	Strengthening an open, democratic, transparent and inclusive WSIS multistakeholder approach, enabling all stakeholders to participate according to their respective roles and responsibilities, in the implementation of the Geneva Plan of Action.
4	Ensuring a clear and direct link and an explicit connection between the key aim of the WSIS, that of harnessing the potential of information and communication technologies to promote and realize development goals, and the post-2015 development agenda, so as to contribute to the realization of the latter.
5	Expanding access to and use of ICTs to all, including broadband and mobile services, particularly to vulnerable and marginalized people who must have a variety of opportunities to strengthen their social position through ICTs and e-services, through continued and increasing practical measures of inclusion, while at the same time taking steps to enhance trust in the use of ICTs.
6	Promoting the development and availability of simplified devices, including textfree interfaces and applications aimed at digital inclusion.
7	Considering the evolution of existing universal service programmes into programmes for digital inclusion that support broadband services for all people as well as those in rural and remote areas where not only market forces exist but public investment may be necessary.
8	Mainstreaming gender issues across all WSIS action lines and from strategies and planning through to implementation, to ensure action lines take account of continuing gender issues, redress discrimination and contribute to ending violence and harassment.
9	Ensuring universal access to information and knowledge and the capacity to use ICTs for all people, including by offering services and ICTs that are inclusive of, accessible and affordable for persons with disabilities, e.g. by providing assistive technologies and through the effective implementation of appropriate international interoperable technical standards, disability-inclusive development frameworks and enabling policy environments, incorporating accessibility issues in public procurement policies and in international regulatory fora.
10	Bridging the digital divide by promoting inclusiveness and by facilitating countries' economic growth. Through the development and advancement of ICTs including broadband networks as well as the provision of affordable access and public access points.
11	Assisting developing countries to expand broadband infrastructure and take measures (such as Internet Exchange Points) to improve the quality, increase the connectivity and resilience of networks, foster competition and reduce the costs of local/national, regional and international connections, including enabling more local content and local e-services to be provided in those countries.

12	Encouraging Governments and intergovernmental organizations as well as private institutions and organizations to pursue policies and programmes that advocate for and promote media and information literacy (MIL) and lifelong learning for all, so as to help users develop their abilities to evaluate and interact with online information resources.
13	Fostering ICT capacity-building and ensuring that professional expertise keeps pace with advancing technology by building mechanisms for ICT skills development, to support economic development, help generate jobs and allow more people to benefit from the information society.
14	Harnessing ICTs with scientific and educational initiatives and activities, including exploring mechanisms for accreditation of online learning.
15	Working towards a more culturally and linguistically diverse world, with multilingualization of ICTs, including Internet, email, search engines and native capability for international domain names (IDN) and Unicode and by encouraging relevant and useful multilingual and local digital content, so that all members of the community are able to understand and participate in online life and contribute to online content.
16	Ensuring the preservation of digital heritage in the information society by putting into place cohesive, conceptual and practical digital strategies, supported, to the extent practicable, at the international level, for the preservation of and access to recorded information in the digital environment in all its forms while respecting individual privacy.
17	Prioritizing the sharing of existing expertise and best-practice solutions between all stakeholders and creating replicable and sustainable ICT projects.
18	Reiterating our commitment to deepening and strengthening the actions taken in implementing the WSIS action lines, with an evaluation of the lessons learned over the past ten years so that others may benefit from the experience and to address the challenges we face today.
19	Promoting a digital economy, ensuring equal opportunities for all in creating and providing online services and promoting e-commerce and international free trade while addressing the tax challenges of the digital economy.
20	Addressing e-environment issues and challenges, developing Green IT and using ICTs to mitigate climate change.
21	Recognizing the importance of maintaining open ICT standards development processes for innovation in the ICT sector as key enablers for an inclusive information society.
22	Supporting providers of public access in local communities such as libraries to help people access information resources they need and develop information literacy skills to improve their lives.
23	Urging Governments and intergovernmental organizations, with involvement of all stakeholders in their respective roles and responsibilities, to continue to support and facilitate enabling regulatory, legal and investment environments for ICT for development.
24	Maximizing opportunities to leverage ICTs, and transformative technology more generally, as enablers for social and economic development by creating appropriate national strategies and policies for the advancement of WSIS/ICT for development goals and by encouraging cooperation among all stakeholders, in their respective roles and responsibilities at the national, regional and global levels, to further the implementation of the Geneva Plan of Action.
25	Supporting and encouraging stakeholders, in their respective roles and responsibilities, to work together for the continued technical evolution of ICTs to address known weaknesses and to increase capability, while maintaining full interoperability and stability.
26	Furthering the multistakeholder dialogue on network neutrality, as appropriate.
27	Building confidence and security in the use of ICTs, notably on topics such as personal data protection, privacy, security and robustness of networks.
28	Enhancing national and regional capacity to address cybersecurity challenges by encouraging a culture of responsibility and joint efforts of all involved parties according to their roles to address security risks. In this respect, further strengthening cooperation between all stakeholders at the national, regional and international levels is required.

29	Promoting a culture of online security and safety, empowering users, and encouraging national, regional and international cybersecurity strategies to protect users, including children.
30	Reaffirming our commitment in regard to ethical dimensions of the use of ICTs in regard to paragraph 25 of the Geneva Plan of Action and as described in paragraph 43 of the Tunis Agenda.
31	Promoting professional standards and continued research on the ethical dimensions on the uses of ICTs.
32	Providing assistance for those countries that would like to adopt legal frameworks to promote their domestic ICT markets in the future, and providing other forms of assistance.
33	Encouraging the full deployment of IPv6 to ensure the long-term sustainability of the addressing space, including in light of future developments in the Internet of Things (IoT).
34	Developing agreed goals and time-based measurable targets data and indicators along with enhanced monitoring and reporting.
35	Encouraging the ongoing assessment of progress towards the information society, as envisaged in the WSIS Outcomes, including through efforts such as the Partnership on Measuring ICT for Development, which has been essential for evaluating the implementation of WSIS action lines.

Annex II

Regional aspirations beyond 2015 and how they tie in with WSIS+10 priorities and the SDGs

Regional aspirations based on ESCWA studies, reports and consultancies	WSIS+10 priorities	SDGs
Developing a regional action plan, from which national action plans could be derived, to tackle the technological aspects of the post-2015 development action plan for the Arab region, based on the SDGs.	4	All
Creating regional and national mechanisms for the development and/or transfer of environmentally sound (green) technologies in support of sustainable development in the region.	20	6, 7, 9, 12, 13, 15, 17
Rationalization of R&D spending on technology, in particular where it relates to sustainable development.	20, 21	6, 7, 9, 12, 13, 15, 17
Leveraging STI to spur the development of local, high value-added products and facilitate the transformation into a digital and knowledge-based economy.	19	8, 9, 12, 17
Fostering a legal, organizational and investment environment conducive to the development of technology and innovation for development, and provision of the necessary funding mechanisms.	23	17
Rolling out integrated sectoral e-service strategies in the broader framework of national and regional strategies.	24	2, 3, 4, 17
Supporting e-government programmes and services and accelerating their implementation by re-engineering procedures in public institutions, which in turn would improve service provision, enhance institutional transparency and efficiency and involve the general people in decision-making.	2, 5	16
Instilling confidence in ICT services by making them secure, especially with regard to data protection and privacy; reinforcing national and regional capacity to deal with cybersecurity risks and combat cybercrime and cyberwarfare.	27, 28	9, 11, 17
Expanding basic infrastructure, in particular in terms of fixed and mobile broadband coverage, so as to bridge the digital divide; taking the necessary steps (such as setting up IXPs) to boost quality; expanding communications capacity, the number of public telecommunications centres, local content and e-services; and reducing costs.	5, 10, 11	9
Guaranteeing full access to information, knowledge and ICT services, including through distance learning, and facilitating the use of this technology by persons with special needs.	9, 14, 22	1, 9
Making ICT services more widely available to women, marginalized and disadvantaged communities, and people living in remote areas, and thereby helping to better their social position.	7, 8, 22	1, 5
Promoting the development of simplified devices and applications in the interest of digital inclusion.	6	1, 5, 9
Building ICT capacity, especially to propel development forward, and promoting an information culture and life-long learning for all so as to help users to hone their ability to tap into information sources on the web.	12, 13, 14	1, 4, 17

Ushering in the digital and knowledge economy and encouraging entrepreneurship and e-commerce.	19	8, 17
Generating jobs and thereby giving as many people as possible, especially women and youth, the chance to reap the benefits of the information society.	13	1, 5, 8
Making a digitally diverse cyberspace a reality (in terms of culture, language, health, agriculture and so on) through, among other things, the use of the Internet, email, search engines and domain names in non-Latin script, and local digital content, all of which facilitate participation in online life and content.	15, 16	1, 2, 3, 4, 6
Ensuring cooperation and the exchange of experiences and best practices between all ICT stakeholders, with a view to launching sustainable and transferable projects.	3, 17	17
Protecting Internet users, especially children, and ensuring that ethical dimensions are respected in the use of ICT.	29, 30	11
Measuring progress in achieving the information society and developing the ways and means of doing so.	34, 35, 36	17

Note: the priorities referred to are those of the WSIS+10, which can be found in the final document, available from www.itu.int/net/wsis/implementation/2014/forum/inc/doc/outcome/362828V2E.pdf. The 17 SDGs are available from www.un.org/sustainabledevelopment/development-agenda.

Endnotes

Introduction

1. See www.itu.int/dms_pub/itu-s/md/03/wsis/doc/S03-WSIS-DOC-0004!!PDF-E.pdf.
2. See www.itu.int/dms_pub/itu-s/md/03/wsis/doc/S03-WSIS-DOC-0005!!PDF-E.pdf.
3. Over the period 2003-2015, the number of ESCWA member States increased from 13 to 18. In the present study, the "Arab region" refers to all countries in the Arab Mashreq, the Gulf Cooperation Council and North Africa, which include 17 ESCWA member States, namely Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, the Sudan, the Syrian Arab Republic, Tunisia, the United Arab Emirates and Yemen. None of the regional profile reports have covered Mauritania to date, given that it only recently joined ESCWA. Algeria appears in several tables so as to include all North African countries.
4. A/RES/56/183.
5. See www.itu.int/dms_pub/itu-s/md/03/wsis/doc/S03-WSIS-DOC-0005!!PDF-E.pdf.
6. See www.itu.int/net4/wsis/forum/2015/Content/doc/reports/wsisstocktaking-report-2015.pdf.
7. WSIS +10 Statement on the Implementation of WSIS Outcomes. www.itu.int/net/wsis/implementation/2014/forum/inc/doc/outcome/362828V2E.pdf.

Chapter 1

1. Reach Initiative. http://kingabdullah.jo/index.php/en_US/initiatives/view/id/84.html .
2. See www.mincom.tn/index.php?id=283&L=1&tx_ttnews%5Btt_news%5D=1426&tx_ttnews%5BbackPid%5D=1802&cHash=76ecefed33 (in Arabic).
3. See www.mpt.gov.lb/index.php/en/about-mpt-2/mpt-news/48-latest/374-lebanon-2020-digital-telecom-vision.

Chapter 2

1. These cables cover 21 countries, including ESCWA member States (with the exception of Palestine that has yet to be connected) and Algeria, the Comoros Islands, Djibouti and Somalia.
2. See www.arabadvisors.com/files/reports/ArabAdvisors-Submarine%20Cable%20Systems%20in%20the%20Arab%20World%20-%20TOC.pdf.
3. See www.broadbandcommission.org/documents/bb-annualreport2012.pdf.

Chapter 3

1. The Networked Readiness Index is a composite index, composed of four sub-indexes since 2012, namely environment, readiness, usage and impact. Each sub-index is divided into pillars that are measured using individual indicators, developed over time. Before 2012, the Index comprised three sub-indexes only, namely environment, readiness and usage.
2. The ICT price basket is a composite index comprising three sub-baskets, namely fixed telephone, mobile telephone and fixed broadband Internet services. The ICT price basket is the sum of all three sub-basket, expressed as a percentage of monthly GNI per capita, divided by three. To date, the ICT price basket does not cover the price of mobile broadband services, although efforts are being made to include it.
3. The second edition of the Open Data Barometer Global Report, prepared by the World Wide Web Foundation, was published in January 2015. Available from http://opendatabarometer.org/assets/downloads/Open%20Data%20Barometer%20-%20Global%20Report%20-%202nd%20Edition%20-%20PRINT.pdf.

Chapter 4

1. See http://mptf.undp.org/document/download/3799.
2. For more information on the project, see chapter X, section 3 (e) of the present report.
3. See www.asrenorg.net/?q=content/arab-nrens.
4. Arab Support Centre for Free and Open Source Software, with headquarters at the University of Balamand in Lebanon.
5. See http://motah.org.sa.
6. See www.escwa-aigle.org/ar/case-studies.
7. INSEAD and WIPO, Global Innovation Index, 2003.
8. See http://reports.weforum.org/global-competitiveness-report-2014-2015.

Chapter 5

1. See www.cio.gov.bh/cio_ara/SubDetailed.aspx?subcatid=691.
2. Batchelder and others, Worldwide Threat Assessment, Microsoft Security Intelligence Report, vol. 12, July-December 2011.
3. See https://www.unescwa.org/cyber-legislation.
4. See www.kuna.net.kw/ArticleDetails.aspx?id=2447086&Language=ar (in Arabic).
5. See http://n.annabaa.org/news342 (in Arabic).
6. https://www.unescwa.org/publications/policy-recommendations-cybersafety-arab-region.
7. See http://www.omaninfcattach.com/print/1/10317 (in Arabic).
8. The following countries participated in developing the legal framework to protect children on the Internet: Algeria, Bahrain, Egypt, Iraq, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Tunisia and Yemen, in addition to a number of regional organizations and civil society institutions.

Chapter 6

1. See www.bsa.org/~/media/Files/Research%20Papers/GlobalStudy/2014/2013GlobalSurvey_Study_en.pdf.
2. See chapter X of the present report for information on ESCWA efforts to coordinate cyberlegislation.
3. See www.wipo.int/edocs/pubdocs/en/economics/gii/gii_2013.pdf.

Chapter 7

1. See www.un.org/en/development/desa/publications/connecting-governments-to-citizens.html.
2. See www.un.org/en/development/desa/publications/e-government-survey-2014.html.
3. See E/ESCWA/ICTD/2009/12, box 11.
4. ESCWA, based on www.emarketer.com/Article/B2C-Ecommerce-Climbs-Worldwide-Emerging-Markets-Drive-Sales-Higher/1010004.
5. Arab Advisors Group, Saudi Arabia Internet Users and E-commerce Survey, 2011.
6. Arab Advisors Group, Egypt Internet Users and E-commerce Survey, 2010.
7. See http://marketing.payfort.com/mailshots/url/sop15/SOP15_Final_En.pdf.
8. See www.arabianbusiness.com/press_releases/detail/24692.

9. See www.emarketer.com/Article/Worldwide-Ecommerce-Sales-Increase-Nearly-20-2014/1011039.

Chapter 8

1. See www.itu.int/net4/ITU-D/CDS/ConnectArabStates/programme.asp?language=ar (in Arabic).
2. See www.itu.int/wsis/implementation/2014/forum/dam/documents.html#high-level.
3. Moroccan Ministry of Industry, Trade, Investment and the Digital Economy, 2013.
4. See www.mcit.gov.eg/Ar/Publication/Publication_Summary/660/ICT.
5. See www.ictfund.ae/arabic/Arabic_Digital_Content-A.html.
6. Fayez, A. (ed.) (c)2013. *Information Systems Applications in the Arab Education Sector*. Hershey, P.A.: IGI Global. p. 8.
7. See www.qrce.org.
8. See www.kuwaiteaward.org.kw.
9. See www.qnl.qa/app/media/978.
10. See https://www.unescwa.org/sub-site/digital-arabic-content.
11. See http://stats.wikimedia.org/EN/TablesWikipediaZZ.htm.
12. See www.socialbakers.com/blog/1064-top-10-fastest-growing-facebook-languages.
13. See http://news.arabnet.me/ar/the-rise-of-the-arab-world-webmd-portal-medical-reference-app.
14. See www.unescwa.org/publications/status-digital-arabic-content-industry-region.
15. See css.escwa.org.lb/ictd/docs/Syria-2013-EN.pdf.
16. See http://corp.diwanee.com.
17. See www.endeavor.org/in-the-news/lebanons-diwanee-media-announces-majority-acquisition-by-french-publishing-company-webedia.
18. See http://baderlebanon.com/mevp-and-building-block-equity-fund-invested-shahiya-exits-for-13-5m.
19. See css.escwa.org.lb/ictd/docs/Syria-2013-EN.pdf.
20. See http://translate.google.com.lb/about.
21. See www.arabicwebdays.com and http://googleblog.blogspot.com/2012/11/join-arabic-web-days-movement.html.
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6. See http://data.worldbank.org/indicator/TX.VAL.ICTG.ZS.UN.
7. Imports and exports of ICT goods and services include: telecommunications goods, audio equipment, video, computers and related equipment, electronic components, among other ICT goods – but they do not include software.
8. See https://www.unescwa.org/sites/www.unescwa.org/files/publications/files/e_escwa_ictd_13_4_e.pdf.
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Chapter 10

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Chapter 11

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4. ITU (2014) Final WSIS Target Review – Achievements, Challenges and the Way Forward. Geneva.
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Conclusion

1. See www.unescwa.org/sub-site/94319/publications.

Annex I

1. WSIS +10 Statement on the Implementation of WSIS Outcomes, pp. 29-33. http://www.itu.int/net/wsis/implementation/2014/forum/inc/doc/outcome/362828V2A.pdf.

The term "information society" refers to a society where the generation, administration and exchange of information play a key role in achieving economic and social development, improving living standards and promoting a sound business environment. The information society employs information and communication technology (ICT) to effect change in the social, economic, commercial, cultural, educational, health and political aspects of life, so as to ensure progress towards a global knowledge-based economy.

The present study, the seventh and last in a series of ESCWA reports entitled "Regional Profile of the Information Society in the Arab Region", reviews progress towards an information society in the Arab region for the period 2003-2015 and sets out key post-2015 priorities related to building a knowledge society and digital economy, taking into account the Sustainable Development Goals. Policymakers in Arab countries can use the analysis, outcomes and recommendations contained in this report to develop a guiding framework for policy and strategy formulation aimed at advancing the information society; to launch various national and regional initiatives and projects to promote investment in ICT; to encourage scientific research and technological innovation and development towards a knowledge-based economy; and to reduce the digital divide and knowledge gaps between ESCWA member States and between the Arab region and the rest of the world.

Each chapter in this report considers one principle of the information society, as identified at the World Summit on the Information Society, and presents a comparative analysis of Arab countries' progress towards that principle. The chapters also consider the strengths and limitations of the Arab region in achieving these principles, and set out recommendations for developing the information society. Readers can therefore either peruse the study in its entirety or focus on individual chapters, given the comprehensive information contained in each chapter.

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