

NATIONAL PROFILE OF THE INFORMATION SOCIETY IN TUNISIA, 2013



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NATIONAL PROFILE OF THE INFORMATION SOCIETY IN TUNISIA

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Introduction

Building the information society depends on taking advantage of the opportunities offered by ICTs to achieve real progress in several areas in the region. Tunisia has had an active role in placing the information society among the priorities of the international community by proposing in 1998 to hold the World Summit on the Information Society and by hosting the second phase of this summit in 2005. Since then, Tunisia remained committed to achieve the WSIS outcomes and has worked on stimulating the "Tunis Agenda" recommendations derived from it.

In this context, the ICT sector recorded a growth rate of 14.6 per cent in 2012, while the percentage of its contribution to the GDP has reached 7.6 per cent. These achievements are embedded within an integrated strategy aiming at promoting the sector and increasing its contribution to economic and social development. Intense efforts have been made to update the regulatory and legal frameworks for a further open and free sector, in addition to enhancing Information and Communication infrastructure, developing applications, digital content and services and sustained investment by ensuring a climate of digital confidence and integrity of the cyberspace.

I. THE ROLE OF THE GOVERNMENT AND ALL STAKEHOLDERS

As stated in paragraphs 73 and 79 of the Tunis Agenda 2005 and the results of the constituent meeting, held in Tunis on 4 September 2012, the National Internet Governance Forum (IGF) was established and a multilateral advisory group (MAG) was elected during the plenary session held in March 2013. The National Internet Governance Forum – Tunisia, is a platform for multilateral discussion to address questions and issues related to the Internet in general and its governance in particular. The National Internet Governance Forum is based on the general principles of openness, pluralism and transparency.

A. NATIONAL INFORMATION SOCIETY POLICIES AND E-STRATEGIES

In recognition of the important role played by ICTs in economic and social development, an ambitious strategy was adopted in 2013 aiming to "make Tunisia a model of ICT integration for social and economic transformation and positioning it as a pioneer in the European, Middle East and African markets". This strategy has six axes:

- Ensure access to high quality broadband networks at an affordable price;
- Make ICT a key element in the development and competitive enhancement of small and medium Tunisian companies;
- Promote ICT integration in education and training for skills improvement;
- Develop and promote the use of national digital content with high added value;
- Position Tunisia as ICT industrial platform for Europe, the Middle East, and Africa and encourage the emergence of major national companies in the area; and
- Develop research by strengthening relations with industries and encourage innovation.

Various stakeholders from civil society and the private sector are working to further develop this strategy to be implemented in a participatory multilateral framework.

Other sectors have also, in recent years, witnessed remarkable developments on the use of ICTs through sectoral plans in the digital areas, including:

- Strategy development of Tunisian e-governance;
- Plan to promote the use of smart transport systems;
- The integration of ICTs in the educational system; and
- E-health plan.

The following table gives a summary about ICT sector strategy:

ICT strategy exists	(YES)
Year of adoption	(2013)
Government agency in charge	Ministry of ICT
Pace of implementation	In Process

B. PUBLIC/PRIVATE PARTNERSHIP (PPP) OR MULTI-SECTOR PARTNERSHIP (MSP)

Since the beginning of the Tunisian revolution, participatory action has become more effective as policy elaboration, law updating and major project adoptions are subject to extensive consultations between the concerned parties, namely the government agencies, the private sector and civil society associations. In spite of the difficulties that can be generated from this participatory approach, it is often an incentive leading to better acceptance of new projects and commitment to make them successful.

Tunisia has a special law, No. 13 of 2007, concerning the establishment of a digital economy, which includes provisions authorizing the state, local groups and public institutions to enter into partnership with private sector institutions in the field of digital economy whereby joint projects agreements are signed. This law has enabled the achievement of several projects in partnership with the private sector, including smart

transport projects and acquisition of operating systems licenses for the benefit of governmental institutions with Microsoft Company. It's mentioned that this law is currently being reviewed to give it more flexibility and to expand its scope to other sectors.

C. THE ROLE OF NON-GOVERNMENTAL ORGANIZATIONS

The Tunisian ICT Scenery has a significant number of central and regional civil society associations that work for the dissemination of digital culture and building the information society. These associations specialize in many areas, such as Internet and computer security, open-source systems and ICT. They play an important role in determining the policies and major projects of the country. They contribute effectively by participation in the organization of various national and international events. Among these associations are:

- The Association of Information Security Experts Tunis, that works on spreading and disseminating the culture of cyberspace security and promoting digital trust principles via scientific forums and symposia organized periodically to spread the benefits of conducting an audit for information systems and protection and maintenance of data integrity;
- Association of Telecom Higher Schools Graduates, which is working to provide a platform to discuss ICT policies and strategies and technological developments in the sector through a variety of events and special annual symposiums, especially one which is organized annually and coincides with the world ICT Day on May 17;
- Open Sources Professional Association (Tunisia), an association working to propagate and disseminate the culture of open source software and to introduce at national level.

Moreover, the revolution of January 14 has enabled the Tunisian civil society associations, which had a limited presence before the revolution, to get engaged in a new phase; as more than one thousand association in every area have been created during the first months following the revolution and their numbers will likely continue to increase in the coming years.

II.ICT INFRASTRUCTURE

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

A. MARKET STRUCTURE AND THE REGULATORY LANDSCAPE

The telecommunications market in Tunisia is characterized by the presence of three operators; each of them benefits from a global license to provide fixed and mobile phone, 2G and 3G, and internet services. The liberalization of telecommunication sector and the admission of two new operators, in addition to the incumbent operator, have produced an evolution and diversity in the provided services. This situation has induced the emergence of innovative services using the latest technologies. It also aided in the development of indicators of the telecommunications market related to Internet, mobile and fixed phone.





Telecommunications market evolution is noticed in particular through the increased number of subscriptions to internet services, which recorded a growth of 32 per cent in 2012 compared to 2011, in addition, the number of subscriptions to mobile phone services reached 119 per cent of the total population in Tunisia, while the number of subscriptions to fixed phone continued to decline and recorded a drop by about 10 per cent in 2012 [2].



Figure 2: Evolution of the number of subscriptions in fixed and mobile phone networks (million) [3]

Table 1 presents a spotlight on competitiveness in the various services.

Table 1. Competitiveness in the various services				
Mobile Phone Services	(Competitive)			
Fixed Phone Services	(Competitive)			
Internet Services	(Competitive)			

B. PENETRATION OF ICT SERVICES

Due to the development of competition and the big variety of services offered, the mobile phone networks had the biggest share of communication activities. At the end of 2012, the number of subscriptions reached 12,841,277 the density of mobile phone reached 118.6 and has a registered growth rate of 2.6 per cent vs. that of 2011. As for the fixed telephone networks, the phenomenon of decreasing number of subscriptions has continued since 2010. The total number of subscribers reached 1,105,586 at the end of 2012 i.e. 10.2 telephone density, which recorded a decline of 10 per cent compared to 2011 [2].





Internet development has continued throughout 2012, the total number of subscriptions achieved were 1,128,886 providing a registered growth rate of 32 per cent. This development is due to the demand witnessed by 3G internet keys in which the number of subscriptions during 2013 exceeded the number of subscriptions via fixed networks. The proportion of households with access to Internet has also increased to 17.1 per cent i.e. a growth rate of 19.6 per cent in 2012.

The total number of Internet service providers is twelve providers, five of them are from the private sector and the rest belongs to the public sector. Similarly to the Internet the spread of computers has witnessed remarkable development; the rate of growth in 2012 was 11.1 per cent, the total number of computers reached 1,770,082 which is equivalent to approximately 16.3 computers per 100 inhabitants, i.e. proportion of families equipped with a computer 23.2 per cent [2].



Figure 4: Evolution of number of computers[3]



C. INITIATIVES/PROJECTS ON ICT INFRASTRUCTURE AND THE DEVELOPMENT OF NEW SERVICES:

After consolidating competitive climate for telecommunications, the various national resources are being controlled and well managed to provide a competitive and healthy environment to attract investment. Such a climate ensures the provision of telecommunication services to all segments of society, without exclusion or marginalization, and grant a high quality at affordable prices in addition to strengthening the state's financial resources. In this context, the ministry has worked on implementing a range of orientations according to the features of the national strategy for the development of Very-High-Speed Broadband. Legal provisions on the realisation of network access and their exploitation, has been revised. The National Strategy for the Development of Very High Speed Broadband is based on the following orientations:

At the level of the transportation networks:

Allow telecom operators to exploit the alternative infrastructure of optical fiber networks which is available at public entities, such as Tunisian Company of Electricity and Gas, the National Railway Company, and Tunisia Highways, with the aim of increasing the coverage and the quality of service for the entire territory of the Republic.

In this context, the communication law has been revised to enable operators to exploit the infrastructure available at public facilities which belongs to non-telecom operators.

At the level of network access and back-hauling:

By reference to available fiber-optic networks and compared with the ambitions for Higher-Speed Broadband, some proactive measures has been taken, such as:

- Commit all actors in the field of land planning to adopt optical fiber as the infrastructure for communications, in accordance with the procedures and standards quoted in the Tender Document (Terms of Reference) published on the website of the Ministry of Information and Communication Technologies, for areas of municipal, urban development, industrial and new tourism areas;
- Completion of internal networking for major regions and constructions within the municipal areas;
- Allocate the necessary channels for underground cables when extending roads and network facilities to avoid the consequences of re-works and its additional burdens;

- Commit telecom operators to take into consideration necessary additional capacities when establishing their networks in order to be exploited by competitors.

D. ICT CONNECTIVITY

The proliferation of computers and the advanced Internet access proportions enabled the Tunisian society to makes its way towards the information society in advanced ranks among African and Arab countries.

Tunisia has achieved those advanced ranks due to the adopted orientation which is based on the establishment of sectoral computing centres. These centres contributed to the development and the use of various ICT technologies and to properly implement and exploit them in accordance with the specificity and the needs of the concerned sector. Among these sectoral computing centers:

- Computing Centre for the Ministry of Public Health;
- Computing Centre for the Ministry of Finance;
- Computing Centre for Child;
- Computing Centre for the Ministry of Higher Education.

E. INTERNET INFRASTRUCTURE

The Tunisian network is based on multimedia switches interconnected with a network of high-capacity optical fibre cables throughout the whole country which insures, at the same time, traffic distribution for phone, Internet and multimedia without discrimination. This technology has enabled to expand the use of the "broadband" Internet to the different regions and to develop the ratio of broadband subscriptions to reach 90 per cent compared to the total number of subscriptions in 2012. 3G mobile phone networks, covering almost all residential zones, has helped to further spread Internet infrastructure and, at the same time, to offer the possibility of broadband Radio Access, using "fly boxes" and 3G USB keys. Within the short term, these solutions have become competitive compared to fixed ADSL subscriptions by reaching over 50 per cent of the total of Internet subscriptions. Also, an experimental network for 4G mobile communications is being prepared for launch in some internal regions of Tunisia, and will be generalized in the coming years by selling licenses.

The Internet usage development within the country has induced the development of international Internet bandwidth. Capacity has doubled more than sixteen times between 2008 and 2012 to pass from 5 Gbit/s to 82.5 Gbit/s by the end of 2012 [2].



Figure 6. Development of International Internet Bandwidth Capacity

III. ACCESSIBILITY TO INFORMATION AND KNOWLEDGE

ICTs provide rapid access to information and knowledge, thereby enabling individuals, organizations and communities. Therefore, this area of work seeks to promote and raise the available public sector information and increase individuals' access to information and knowledge.

A. PUBLIC DOMAIN INFORMATION

Since the beginning of the Tunisian revolution, the Government has taken a set of legal procedures with regard to the access to administrative documents of public structures. The Decree No 41 for 2011 - Chapter 22 mentions that "Public structures must fully adopt the provisions of this decree and shall also publish the above mentioned reports on the web sites of the concerned public structures".

This law commits all public structures to publish every administrative document containing information on its structural organization, its different tasks and functions, and its political and financial decisions (Government debt, macroeconomic, Government assets and liabilities, Government funds management) This includes as well documents on regular decision-making monitoring mechanism, staff and functions guide and the various references and internal laws, which generates an electronic version of the administrative documents.

The web site "data.gov.tn", launched in July 2012 by the Presidency of government, reflects a tendency toward an open Government in Tunisia. This Portal has been designed in order to "provide an access to the data published by the various public structures in Tunisia in an open and free approach, and also, to create a new culture within the Tunisian administration based on transparency and openness. This site is compliant with international standards relating to open data and is managed in collaboration with various departments and ministries, thus the site contains a lot of information relating to various sectors such as tourism, education, higher education, finance and taxation, environment and new technologies.

B. ACCESS TO INFORMATION AND PUBLIC INFORMATION

Based on the requirements of the decree mentioned above, on access to the information, all ministries worked on accomplishing or updating their own Web sites through which they publish several information, data and administrative documents.

The Social network sites, particularly "Facebook", are witnessing a significant demand by surfers, as statistics have illustrated that 82.9 per cent of the total number of surfers in Tunisia (over 3 million citizens) have Facebook accounts. The total audience on Facebook site is 97 per cent of social network sites, followed by Youtube site (1.6 per cent) and Twitter about (1.01 per cent) [5].

Due to the ability of these sites to attract surfers and their supremacy in most cases on the official Web sites in terms of audience, ministries and public structures have been invited to develop official pages on social network sites. According to the latest statistics, until September 2012, the number of these pages on Facebook has reached 22 sites. Also, in the context of rehabilitation program for Web Sites of public institutions, they were invited to facilitate access for people with disabilities and to conform their web sites to international standards for digital access and control in order to facilitate access to these Web sites for people with disabilities.

C. MULTI-PURPOSE COMMUNITY PUBLIC ACCESS POINTS

With the support of government, the first set of public Internet centres has been established within the scope of a program designed to simplify the concepts of informatics and the dissemination of Internet services across the country on the one hand and, on the other hand, to enhance employment opportunities for graduates. To encourage new promoters, the state has decided to support the first one hundred projects by granting fifty percent of the cost, provided that the project owners shall pay the remainder fifty percent in form of limited interest-rate bank loans. It is noted that these centres provide all services related to Internet navigation, electronic messaging, telecopy, download, print, study researches, guidance for beginners.

The number of such centres has increased in the first phase to reach 400 centers, but Internet dissemination and the increasing number of Internet connected households has obliged this large number to decrease from year to year. Another reason for the decline in the number of public Internet centres is the number of public institutions connected to Internet, such as educational institutions, public administrations, post centres and other public institutions. However, public Internet centres have remained one of the main communication tools in rural and poor areas.

IV. ICT CAPACITY BUILDING

Everyone should have the necessary skills to benefit fully from the Information Society; therefore capacity building and ICT literacy are essential. ICTs can contribute to achieving universal education worldwide, through delivery of education and training of teachers, and offering improved conditions for lifelong learning, encompassing people that are outside the formal education process, and improving professional skills.

A. ICT IN EDUCATION & TRAINING

Tunisia has integrated information and communication technologies (ICT) at all levels of its educational system in addition to the implementation of several training programs for teachers which were designed for their rehabilitation and the empowerment of their basic capabilities in ICTs. Furthermore, all higher education institutions are connected to Internet through a public Internet provider institution called "Khawarizmi centre" which provides in addition to Internet connectivity a set of on-line resources and programs.

The Tunisian Virtual School and The Virtual University of Tunis (VUT) has further enhanced the integration of ICTs in education. Tunisia is one of the first countries in North Africa and Arab States that have adopted the field of distance education and e-learning through the launch of the Tunisian Virtual School since 2002 which provides an interactive service addressed to students for revising and giving them remote assistance, in addition of training units in ICTs. As for the Virtual University of Tunis (VUT), which was established in 2003, it offers a number of courses through e-learning and awards diplomas and certificates.

Tunisia has relied on higher education in the field of information and communication technology and gave it a top priority and worked to create many higher schools and new sections in different specialties for this field. This approach has raised the number of students in the field of ICT to reach approximately 54 thousand students for the academic year 2011/2012, which represents 16 per cent of all higher education students. At the same year, at least 13 thousand students graduated from higher education institutions specialized in ICT fields [2].

Tunisia has also worked on the development and implementation of several programs aiming at facing illiteracy. Teaching methods and formulas, in this regard, have witnessed remarkable diversity by the inclusion of computer/ICTs in learning and using TV lessons for more promotion of social communication; this has enhanced the effective participation in various aspects of life. It is noteworthy that the associative work in the field of adult education is advanced in Tunisia due to the activities carried out by many regional and local associations.

B. TRAINING PROGRAMS FOR CAPACITY BUILDING IN THE USE OF ICT

In the context of national efforts for an optimal use of ICTs, Tunisia has worked on developing the capabilities of university graduates via a competencies authentication certificate. This approach was applied within the framework of the National Program for Certified Training (i.e. at the end of training, trainees receive an internationally recognised certificate of competencies). In order to ensure the success of this ambitious program, the state sponsored 50 per cent of the training cost via the ICTs Development Fund. The beneficiary from the program is responsible for the remaining share of the cost which can be financed through a bank loan or by the employer. The national program is characterized by a reduction of about 50 per cent of the training and exams cost. In the first phase, the axes of the National Program for Certified Training deal with the fields of software development, databases, free software, project management, network management, and computer security.

On the other hand, civil society associations monopolize most of the digital literacy programs targeted to vulnerable groups or people with disabilities due to their experiences in supporting these groups in the far away interior regions and their deep penetration in the different society components. These associations have worked to implement many of the digital literacy programs for the benefit of elderly, retired or categories that did not have the possibility of learning, such as programs in favour of rural women.

V. BUILDING CONFIDENCE AND SECURITY IN THE USE OF ICT

Digital information sensitivity and value continue to increase and thus the need to protect it. This area deals with specific requirements with regard to security and privacy, and specifically the protection of personal information in the case of individuals, and business information in the case of institutions.

A. USE OF ELECTRONIC TRANSACTIONS AND DOCUMENTS

Since 2000, a legal framework in Tunisia manages electronic exchanges and e-commerce through law No 83 of 9 August 2000. The National Agency for Electronic certification (www.certification.tn) was created under this law, which is the root of certification authority in Tunisia, and represents the highest level of confidence in the field of electronic certification and integrity of electronic transactions and exchanges. The Agency's mission in this regard is to ensure the atmosphere of confidence and security for electronic transactions and exchanges, especially in the field of e-commerce. The aim of e-certification is to ensure the safety of electronic exchanges, which concerns many areas such as e-commerce, communicative administration and immaterial banking services.

The Digital signature certificate, provided by the National Agency for Electronic Certification, associates the identity of a person with a public key. It may be used to sign electronic messages and to authenticate at a secured session (e.g. doing an electronic transfer payment). The server certificate ensures the validation of commercial sites and the safety of electronic transactions and exchanges. The solutions proposed by the Agency enable to establish a relationship of trust between the distributor and the customer in guaranteed circumstances.

At the end of 2012, the number of functional digital signature certificates reached 9,627, i.e. a progress by 33.3 per cent compared with the 7,222 certificates in 2011. Also, the number of server certificates reached the number of 349 at the end of 2012, the number of functional server certificates made a progress of 50 per cent when compared with 2011 [2].

B. ONLINE AND NETWORK SECURITY

The National Agency for Computer Security (www.ansi.tn) was created in Tunisia by Law No 5 of 2004 (dated 3 February 2004). The agency missions are mainly: protect the National Cyberspace, early detection and sensing of attacks, major threatening attempts of intrusions, checking the integrity of information systems and provide support for public and private structures through the National Computer Emergency Response Team (CERT). Tunisia's strategy in this regard is based on:

- Enhance the level of information systems safety;
- Enhance the protection of the National Cyberspace against risks;
- Improve training and awareness;
- Ensure technical and scientific watch; and
- Update legal and regulatory aspects.

The agency is working on establishing a periodic mandatory audit in computer security, to ensure optimal and effective application of the necessary procedures to protect sensitive national applications. The agency works also in the development and the establishment of mechanisms for early risk detection (system "Saher"), in addition to effective mechanisms for immediate alarm and addressing schemes for coordination and cooperation between all stakeholders. In this context, it provides the necessary guidance and support to those responsible for security and the general users of the networks, in order to ensure awareness and effectiveness of risk response (TUNISIAN Computer Emergency Response Team tunCERT). This centre consists of:

- Assistance and aid centre (Call Centre, emails and SMS, web sites);
- Computer Security Incident Response Team (CSIRT);
- Cyber Early Warning System (survey the Cyberspace).

As part of its activities to protect national cyberspace, the Agency has increased in 2012 the level of readiness for potential cyber attacks from level 1 to 2, following the threats announced by the group "Anonymous". The Technical analysis registered 170.936 cyber attacks, 90 per cent of which were derived from the global cyberspace. On the other hand, to for further boost and enhance the effectiveness of "Saher" system, specifically as it relates to sensing and early detection of attacks and major breakthroughs that threaten national cyberspace, a new software has been integrated. The software enabled automated analyses of malicious programs and provides accurate statistics about the risks observed and exploitable gaps as well as the methods followed by hackers. It should be noted that the Agency is very active on the international level; it has joined the network of "Excellence Centres" established by the UNCTAD and has also helped to establish many similar centres in Africa and the Arab region due to the experience gained by its experts in the field of computer security and Cyberspace protection [6].

C. PRIVACY AND DATA PROTECTION

In Tunisia, privacy and the data protection are organized by the Law No 63 of 2004, dated 27 July 2004. This law consists of a set of provisions aimed at protecting personal data as well as a number of guarantees to process personal data so as to ensure a balance between modern means of communication and the protection of privacy.

The National Commission for the Protection of Personal Data has been created under this law, which is a structure that ensures the proper application of the provisions of this law. Moreover, this law has passed a set of rules designed to reduce the risk of compromising privacy and has imposed some obligations on the responsible of processing; the treatment itself has also been restricted by a set of constraints and principles. The law still contains many inadequacies and is currently under revision by the concerned parties in order to meet the international standards on the protection and processing of personal data.

D. COUNTERING MISUSE OF ICTS

Tunisia does not yet have a special law on cyber crimes except few chapters in the Criminal Code that criminalize the illegitimate intervention on software and data processing systems. The Communication Code also includes provisions on people who use communication networks abusively in detriment of another party. A new law, specializing in cyberspace crimes, is currently being formulated.

VI. ENABLING ENVIRONMENT

The provision of an enabling environment is crucial in order to mobilize resources and create a climate conducive to the acquisition and dissemination of ICT. Moreover, a trustworthy, transparent and non-discriminatory legal, regulatory and policy environment constitute essential bases for cooperation between the public and private sectors.

A. LEGAL AND REGULATORY ENVIRONMENT

The Tunisian Scenery depends on a legal and regulatory framework which is in continuous development in order to set the transparent foundations aiming at encouraging investment and facilitating the way for sustainable development based on the opportunities provided by the Information Society. This framework is based on a set of laws regulating the sector, such as:

- Law No 1 of 2001 relates to the Communication Code and its applying texts and Decree No. 3026 setting the general conditions for the exploitation of public communications networks and access networks;
- Basic Law No 63 of 2004, on personal data protection;
- Guideline Act No 13 of 2007, on the establishment of digital economy;
- Law No 5 of 2004 on Information Security;
- Law No 83 of 2000 dated on 09/08/2000, on electronic commerce and exchanges;
- Law No 51 of 2005, on Electronic Funds Transfer (EFT)

The Communication Code was amended in 2013 in favour of an appropriate regulatory framework for technological developments, and to reinforce a liberal telecommunication sector adequately with competition rules. This would enable the development of investment in networks, enhance communication infrastructure and contributes to increasing the operational capacity of the sector. This amendment aims at facilitating radio frequencies procedures and increasing the powers of the National Telecommunications Authority. It also intends to organize telecommunications market actors through the development of the legal framework of private Internet service providers and the legal framework governing the activity of virtual network operators, in addition to the provisions enabling effective use of communications infrastructure of the various public facilities operators in respect of sane competition rules.

With respect to intellectual property, it is subject to the provisions of Law No 50 of 2007 dated 23 July 2007, which amended Law No 36 of 2001 dated 17 April 2001 dealing with the protection of manufacture brands, trade and services. The Tunisian Organisation of Protection of Royalty deals with intellectual property, in this context, it's noted that this topic was included in university teaching programs and is rewarded by a Certificate of Advanced Professional Studies in intellectual property right.

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e-transactions law available	(YES)
e-signature law available	(YES)
Management of PKI available	(YES)

B. DOMAIN NAME MANAGEMENT

The National Telecommunications Authority, in Tunisia, contributes to the development of telecommunication sector and ensures a favourable climate for investment and a fair and just competition between the various telecommunications market parties such as operators and providers of telecommunications services. In this regard, the National Telecommunications Authority manages the National Numbering and labelling schemes and sets the terms and procedures to stimulate the preservation of

numbers, especially procedures for the use of mobile numbers. It also determines the conditions and procedures for granting domain names. The following table gives an idea about the top-level domain name in Tunisia (ccTLD).

Name of ccTLD registrar	(National Telecommunications Authority)					
		عاوت	به الوصية للانا	<u>.e.</u>)		
URL of registrar		(h	ttp://intt.tn)			
Total Number of ccTLD registered in the	2008	2009	2010	2011	2012	
country	4466	5818	7597	10479	14199	

Table 3. The evolution of the number of registered domains in Tunisia [7]

C. STANDARDIZATION IN ICT

The Tunisian strategy in the field of Information Technology and Communication dedicates a special interest to Open Source Software as a technical and technological alternative to be considered in new or redesigning system's projects. This strategic direction has been formulated in July 2001 through a National Open Source Software Plan. A Management By Objectives (MBO) Unit has been created in June 2003 to follow up and to ensure the successful achievement of the aforementioned plan, and to update its action programs accordingly.

The national Open Source plan [8] consists of designing and achieving a large number of programs related to the following axis:

- Promote the use of Open Source Software through the organization of awareness building events to diffuse the Open Source Software culture, technical workshops for different stakeholders and training sessions for end-users;
- Provide on-demand technical support, engineering missions and assistance for the use of Open Source Software in public administrations and public enterprises;
- Strengthen human competencies through specific training and certification programs for technical staff and through the use of the Open Source Software in higher education, academia and scientific research;
- Support private enterprises by taking measures to incite them to invest in Open Source Software field and by establishing an assistance plan to foster their networking and their presence at international levels. <u>emarketplace.opensource.tn</u>;
- Focus on technological awareness at national and international levels by tracking up-to-date information and news related to Open Source Software.

On the other hand, all concerned structures are working to raise awareness about the importance of adopting international operational standards (such as e-commerce standards). This concern is reflected in particular through technical conformity control system which enables conformity verification of imported equipments and systems to the international standards adopted in Tunisia.

D. ICT INVESTMENTS AND GOVERNMENT-SUPPORTED FACILITATIONS MEASURES

Tunisia adopted a set of steps to establishing the digital economy and to encourage the investment and stimulate private initiative. To encourage investment, a set of financial and tax incentives has been ratified through Investment Promotion Code and special funds to encourage the creation of innovative ICT institutions. ICT Innovation Incentive System assists oromoters graduating from the University by financing new projects which cost do not exceed 500 thousand dinars, including the net fixed assets.

During 2013, it is expected to launch the "Smart Tunisia" project, which is a program that provides a number of incentives for the benefit of major software development and digital services institutions who set up productive units in Tunis.

VII. ICT APPLICATIONS

The E-government in Tunisia relies on a set of applications which provide a variety of services, whether for the benefit of government structures among themselves or for the benefit of institutions, citizens and other society components. These applications have added efficiency to the major administration services such as time saving and avoiding problems of travelling and transports to a large number of citizens and institutions involved in the information society approach.

A. E-GOVERNMENT

The National Centre for Computer Science [9] is one of the structures which assist public structures in establishing, seting up and exploiting major information systems. The National Centre for Computer Science hosts a special centre for information processing equipped with servers linked to nearly 3,500 remote sites such as ministries, provincial departments and public institutions. It offers its services to host data, dispensers and information systems. Among the tasks of the National Centre for Computer Science is as hosting Centre for processing information and administrative applications such as "Insaf" (application to manage administrative and financial affairs of public officials) and "Adab" (deals with budgetary issues). These are considered government to government (G2G) applications. The National Centre for Computer Science hosts and provides maintenance and exploitation of some of the major citizen-oriented application "government-to-citizen (G2C)" such as "Madania" for managing the national civil status application or "Cicad", an informative Portal on administrative procedures and "Bawaba", the Tunisian administration portal. Some ministries, structures or subsidiaries, host and exploit horizontal applications such as "E-Jibaya" which is managed by the Ministry of Finance through which paying of taxes are carried out online. The Tunisian customs system uses a special application called "SINDA" which enables follow-up on Customs actions online. It was enhanced with "Idhbara" in order to simplify foreign trade procedures and shorten deadlines for the cargo transit at ports, "E-procurement" the application for public purchase is currently being readied to launch; it is at the stage of pilot experimentation in 10 sites, including 4 Ministries and 6 public institutions.

e-government portal: (http://	(tunisie.gov.tn)	
Information:	General Information	(YES)
	Rules	(YES)
	Guides	(YES)
Services:	Interactive Services	(YES)
	Downloadable Samples	(YES)
	Static Information	(YES)
Electronic Payment		(YES)
Users Log-in		(YES)
Presence of Multilingualism	on the site	Arabic - French
Citizen Participation	Surveys	(YES)
	Blogs	(NO)
Social Media Tools	Facebook	(YES)
	Twitter	(NO)
	LinkedIn	(NO)

Table 4. The availability of services through e-government portal

	Youtube	(NO)
	Others	-
Extra Services	Channel Web (RSS)	(YES)
	Web Statistics	(YES)
	Search	(YES)
Version for Mobile Phone / Tablets	Support for Smart Phones / Tablets	(YES)
	Application for Smart phone/Devices (iOS or Android based)	(NO)
Other Services		Services dedicated for people with special needs

The party responsible for introducing ICTs to public administrations	The Ministry of Information and Communication Technologies (http://mincom.tn)		
e - Government Authority	Unit of e-Government (http://tunisie.gov.tn)		
Number of e-government services that have been implemented	160 at the end of 2012		
Number of e-government services to be implemented	200 by the end of 2013		

B. E-BUSINESS

Tunisia's general trends focus on the development of e-business exchanges by establishing the necessary foundations for the advancement of this pattern of trade. These trends were adopted in the frame of the national strategy for the advancement of e-commerce sector, which consists of:

- Provide an advanced and integrated communication infrastructure with high capacity and proper and ensured usage,
- Provide electronic means of payment consistent with the requirements of the global economy and the current situation of monetics and markets (such as E-dinars, i.e. electronic payment provided by Tunisian Post, payment by bank card, touristic allowance cards, Tunisian System for the Transfer of Large Amounts,...);
- Provide human resources with high efficiency who are able to keep pace with scientific and technological development and to cope with the continuous and rapid global novelties;
- Provide the appropriate legal framework such as the Code of Commerce and Electronic Exchanges and Guideline Law for the Digital Economy;
- Enhance the institutional aspect for the promotion of Electronic commercial exchanges through the creation of the National Agency for Electronic Certification and the National Agency for Computer Security, which would contribute to secure and ensure this type of trade;

- Found a Communicative Government using advanced communication technologies in various fields in order to improve the quality of public facilities services and provide efficiency, transparency and professionalism in service performance;

Table 5 refers to the legal texts on e-commerce:

Table 5	. The	legal	texts	on	e-commerce
Lable 5	5 I IIC	iugai	UCAU5	UII	e commerce

Availability of e-banking services	(YES)	Law Number 51 of 2005
Availability of e-commerce law	(YES)	Law Number 83 of 2000
Availability of e-transactions law	(YES)	Law Number 83 of 2000

C. E-LEARNING

ICT has been included in the Tunisian education system as tools that allows the integration of knowledge and allow learners to build their own path to learn effectively and find information themselves to develop their skills through a variety of sources of knowledge. ICT integration is reflected in pedagogical practices that take into account the learning competencies, on one hand, and the capabilities of the ICT sector, on the other hand, in order to achieve horizontal competencies.

On this basis, ICTs have been introduced into all levels of study in Tunisia. In this context, the legislator stressed, in Chapter IX of the Educational Directive Law, on the necessity of ICT integration in all fields of education. The Tunisian Virtual School (www.evt.edunet.tn) falls under this framework; it aims to support cooperative and self-learning through the potential offered by information and communication technologies. Virtual school aims to make the learner depending on herself/himself and get accustomed to dealing with information and communication technologies.

In addition to the lessons placed at the disposal of the fellows, the virtual school provides its students interactive exercises to assess their levels. It also offers a series of virtual library resources such as books, tasks, previous national exams, encyclopaedias, dictionaries and others. This system also provides what is known as a "Virtual Teacher", which provides required supervision for each fellow by following-up training, and directing and responding to questions. It's expected that the virtual school will provide certifying assessment programs in terms of languages and information and communication technologies.

The following table shows the connectivity status of primary institutions, middle schools and secondary schools in Tunisia in terms of the stated technique, the number of connected units and its percentage:

	Number linked institutions by technique					
Type of Institution	Number of Institutions	ADSL	VSAT	FO	2G/3G Key	Connectivity percentage
Primary Schools	4520	2077			2426	99,6%
Basic Schools	915	843	72			100%
Institutes	552	535	12	4		99,8%
Total	5987	3455	84	4	2426	99,7%
Total Connected			5969			

 Table 6. Internet connectivity status and technique in educational institutions[10]

The development of education as well as technical and professional training in the era of knowledge and information should be improved and aim to develop teaching and training methods, and techniques in order to conform to the considerable development of ICTs. Tunisia has worked on the integration of ICTs which is being used in student management systems, the organization of the examinations and online university registration.

Students per Computers	\approx 5 students per computer (about 297,000 students and 60,000 computer)
Schools connected to Internet	99.7%

D. E-HEALTH

The Informatics Centre of the Ministry of Public Health is in charge of e-health in Tunisia, it is a public establishment created in 1992. The centre is in charge of developing computer systems and applications to manage the sector of public health in accordance with international standards and according to technical and economic feasibility conditions. The centre's role has changed since its creation to become the provider of value-added Internet services for all public health structures and institutions, it also provides needed information systems, development, exploitation and maintenance. In this context, the Informatics Centre of the Ministry of Public Health manages many projects, including:

- Information system for public hospitals and institutions, which consists of three applications:
 - Information systems for hospital units management, which enable the financial and accounting management of hospital institutions as well as the management of pharmaceutical and medical products,
 - Administrative and medical Information system, which allows the management of patient records by adopting a single ID and also allows to conduct and follow all the stages of hospital services in clinics starting from the registration processes to accommodating patients until they leave the hospital,
 - Health information system, devoted for laboratories and medical imaging centres.
- Specific applications such as the control of the organ transplant, follow-up of people living with Aids, the control of blood donation, tele-medicine (remote radio Counselling and diagnosis);
- The development of the national health network to become a network of new generation.

E. E-EMPLOYMENT

The spread of the Internet and multiple access methods and its ability to absorb a huge amount of information makes this technology one of the main means used to inform about job available offers and also the most widely used means to get a job. Therefore, ICT has been employed to launch special portals for job offers oriented both to applicants and recruiters. For example, the e-government portal includes job opportunity service which provides information about the job opportunities offered in the public sector in addition to a number of useful data and information for job seekers.

ICTs are also used in the preparation of databases related to job seekers, making it easier to process their files and to guide them until they get a job. These databases guide also decision-makers on the measures to be taken for an appropriate balance between supply and demand in labour market by academic the orientation in education and training.

ICTs provide new job opportunities, especially for women and people with special needs, in this regard; it is to note the great development of call centres in recent years in Tunisia, which provided significant employment opportunities for under employed people and those with special needs.

VIII. CULTURAL DIVERSITY AND IDENTITY, LINGUISTIC DIVERSITY AND LOCAL CONTENT

The Arabic digital content, particularly on Internet, preserves the common language and the national heritage, and facilitates its evolution and promotes cultural diversity. It also enhances social and economic development. Content development can play a key role in strengthening the leading positioning of the region.

A. Use of ICT in support of cultural and linguistic diversity:

Digital storage is characterized with the capacity of big data storage, long conservation periods, and flexibility in use and distribution. Therefore, several specialized Tunisian structures have launched projects on digitizing Tunisian cultural heritage. Among these projects is the "RAED" project in the field of digital documentation, under the patronage of the Ministry of Culture and in collaboration with the Ministry of Employment at a cost of 80 million dinars. The "RAED" Project aims to digitize the national substance and written heritage of the National Tunisian Library, the "Beit El Hikma" Institute and the National Institute for Translation. It will enable the digitization of nearly 200,000 titles of writers in addition to many periodicals and manuscripts during the next 3 years and the number of pages will total about 50,000,000. The pages will be stored in searchable databases with other features. This project will instantly bring information to users, researchers and intellectuals, as it will be connected the biggest global digital libraries such as Google and The European Library.

The Tourism inventory digitization project, managed by the Ministry of Trade and Tourism, is a project that aims to digitize data on tourism specialties and products in various regions with a view to define Tunisia as a distinguished tourist destination.

The websites of various institutions concerned with culture and heritage offer further advertisements and information about monuments and heritage. They provide researchers with pertinent information on these monuments, such as their location, access timing and tariffs. Among these sites we can give the example of the web site of the Agency for Heritage development and cultural promotion (AMVPPC) (http://www.patrimoinedetunisie.com.tn).

B. LOCAL AND NATIONAL DIGITAL CONTENT DEVELOPMENT

A considerable number of Tunisian institutions, organizations, structures of civil society have launched special web sites which reached 14,170 by the end of 2012 the content of these sites varies and contains all kinds of thematic: pedagogical, cultural and commercial information. The Tunisian digital content has taken several forms, in addition to web sites CDs have been used to create recordings, especially with regard to educational programs. This is besides the multiplicity of mobile Tunisian applications which came in conjunction with the spread of mobile smart phones designed according to the requirements of the citizen and the peculiarities of living, making it a good media for selling largely demanded by users.

In order to encourage the development of national content industry, numerous financial incentives have been approved by the government or administrative structures, which promoted the development of content and applications that, take into account the Tunisia's linguistic and cultural specificities. Among these incentives, are:

- Enabled civil society associations with financial grants to develop their own websites. This mechanism has evolved to encourage institutions only to develop interactive sites (web2.0);
- Organized President's Digital Excellence Award which aims at promoting national content and the dissemination of digital culture in the field of administration, education, culture, media, finance and trade based on ICTs, this award comes in the context of national efforts to encourage companies, organizations and associations to produce or use electronic systems and develop digital sites and services with high added value;
- Provide free domain name ".org.tn" and free hosting services to non-profit associations by The Tunisian Internet Agency.

C. ICT SOFTWARE, TOOLS AND R&D PROGRAMS IN ARABIC LANGUAGE PROCESSING

Since 1993, Tunisia has issued several legislations calling for the use of Arabic language in management systems and applications. As result, all systems and applications used in the Tunisian administration have been arabized. Consequently, this orientation has had a positive impact; the software development institutions have arabized programs used and initiated several research projects in order to adopt programs designed to further the use of the Arabic language and the acquisition of technology skills.

D. ARABIC DOMAIN NAMES

The National Telecommunication Authority approved in 2012 the Charter of Arabic Domain Names ".تو نس". The marketing of Arabic domain names was launched in three stages. The first stage was devoted to enrolling Arabic domain names only for the structures and institutions of the state and government agencies, while the second stage was allocated to enrol the names of registered trademarks. The third stage is the stage of total switch-on and was launched in October 2012. Since then, the possibility of registering an Arabic domain name has been offered to any individual or legal person in accordance with the provisions of the Charter of Arabic Domain Names ".ie im.". This action aims to provide registration of domain names within the Arabic domain ".ie im.", especially to encourage the creation of Arabic language content and to contribute to the dissemination of Arab local content internationally.

From this standpoint, the number of top level domain names registered in Arabic that have been booked or marketed reached about 500 in June 2013. Thus, the use of Arabic in the electronic media would address the increase in the number of users and provide access for new social categories. Certainly, the arabization of domain names is a very important step. It would bring the benefit of enabling the users to access content through Arabic titles and domain names without any language barriers starting from turning on the computer to reach easy access to any information on Internet.

IX. MEDIA

Because of the media's ability to reach a large number of people, and their ability to disseminate ideas, facts and information, they play an important role in the promotion and development of the information society, and to achieve the diversity of information sources.

A. MEDIA DIVERSITY, INDEPENDENCE AND PLURALISM

The first Tunisian press started in the 19th century with the publication of the first Tunisian Arabic language newspaper, on 22 July 1860 entitled the "Alrray Ettounissi" which made Tunisia the second Arab country after Egypt to have the written press.

Since then, the Tunisian written press experienced several developments until electronic newspapers appeared, leaving many questions about whether the phenomenon is a threat to the existence of print newspapers or is it a natural progression that they should adopt. The Tunisian written press sector consists of two public institutions, while the rest belong to private sector institutions. After the revolution of 14 January 2011, the sector witnessed many changes, especially in terms of media freedom. The post-revolution era witnessed the disappearance of many titles, especially those that belong to the ruling party or their loyal supporters mainly due to the loss of funding. This period, also witnessed the emergence of a large number of newspapers, which at the end of 2011 reached 228 licensed newspapers, including 17 dailies and 103 weeklies.

The Electronic Press has also made noticeable progress in terms of the number, taking advantage of the large freedoms resulting from the revolution and the absence of legal frameworks regulating various aspects. It has resulted in an indefinite number of electronic press media, called electronic newspapers or electronic magazines. It's expected that the Independent High Authority for Audiovisual Communication, which was launched after the Tunisian revolution and its members, who were newly appointed during 2013, will specify the criteria and conditions for electronic newspapers and magazines.

The following table gives a picture about the status of the media in Tunisia.

The Media	Number	Language	Ownership				Ownership		
			Private	Multiple	Government	Foreign			
Newspapers	17	Arabic/French/English	13		04				
Electronic newspapers									
Magazines	125	Arabic/French/English	124		01				
News organizations	01	Arabic/French/English			01				
Radio	26	Arabic/French	15		11				
Television	09	Arabic	07		02				

 Table 7. The status of written broadcast media [11]

After the revolution, a Decree N0 115 issued on 2 November 2011 deals with the freedom of press. This decree replaced the previous Code of Press, printing and publishing, issued by the Law No 32 of 1975.

B. THE MEDIA AND ITS ROLE IN INFORMATION SOCIETY

The media is one of the main content industry pillars in the information society. They also have an important role in distributing on a wide scale the information society culture, because of their ability to access various social categories. On this basis, the various audio-visual and written Tunisian media produce

programs oriented to various communities, each according to his interests. Because of competition, these media are often in line with the latest technological developments.

Various Tunisian media are working on the deployment of digital culture and the establishment of the Information Society through a variety of programs and productions that aim to further raise awareness and to simplify the use of ICT in order to take advantage of the various opportunities and services which are offered in various areas of life and for different age groups. The Tunisian audio-visual programs are the most accessible media in rural and remote areas due to their broad coverage of the populated areas. It's mentioned that both public and private media provide many awareness programs in the field of ICT use.

To keep up with technological development and to be in-line with the digital revolution, almost all Tunisian media have launched their own website. Through these websites, they broadcast their programs and productions to reach the largest number of customers and they take advantage of extra advertising space to obtain supplementary financial resources.

However, the rush of Media to be online presents many threats to the intellectual property and copyright. Digital productions are easily pirated and copied by using the ICTs means and features. This fact pushes the legislator to keep an eye on technological development in order to curb the piracy phenomenon and to preserve media organizations. Most organizations dislike these arrangements as it increases their financial fragility due to the sector's fast development.

C. CONVERGENCE BETWEEN ICT AND THE MEDIA

The digitization of content has linked the convergence of ICT and media to the capability of infrastructure equipment and communication networks to process digital multimedia information. Tunisia has made headway in this area because of its networks and switchers which were built on the basis of IP technology. This has allowed the integration of various services which are often received on a single device such as mobile phone or tablet. The audio-visual broadcasting sector is the last to have insure this migration, thus audio-visual transmission has been digitized in recent years in all regions of the country where coverage percentage reaches 95 per cent of the population.

X. INTERNATIONAL AND REGIONAL COOPERATION

Building the Information Society requires cooperation among all stakeholders on the international and regional levels, particularly with regard to funding, ICT implementation and development and the establishment of an action plan for edifying the Information Society.

A. FINANCING OF ICT NETWORKS AND SERVICES

Tunisia has worked on liberating the establishment and exploitation of public telecommunications networks. The principle of attributing licenses for the networks establishment and exploitation has been set according to the requirements of Communication Code. In this context, two global licenses have been assigned for both "Tunisiana" and "Orange Tunisia" operators to establish and exploit a 2G and 3G fixed and mobile public network, in addition to Internet services. A share of 35 per cent of "Tunisie Telecom" capital, the incumbent operator, has been freed for the benefit of a foreign partner. This orientation has enabled the development of investment in the sector, increased foreign investment attraction, and the development of public telecommunication network.

It has also helped to enhance Tunisia's positioning as a good destination for international institutions and telecom operators, especially for the appropriate investment climate and the dynamic Tunisian market. The legal framework, affords a set of guarantees on the level of legal and legislative provisions and also on the institutional level which ensures the respect of formalities and procedures according to the law.

B. INFRASTRUCTURE DEVELOPMENT PROJECTS

Given the cost-effective nature of most of the infrastructure development projects, investment in this field has been allocated, in most cases, to private sector, in accordance with the requirements of the legislative and the regulatory texts that organize the sector. To provide comprehensive service in remote areas, which are not cost-effective, the Communications Code has included provisions to enable the operator in charge of universal service to have financial compensation from the ICT Development Fund. Thus, the major interventions of international organizations and donor countries was limited to financing studies aimed at developing infrastructure, especially those related to broadband service and its dissemination to all areas of the country in order to reduce the digital divide between the different regions.

In this context the African Development Bank completed a feasibility study to connect the various countries of North Africa, including Tunisia to optical fiber cables within the framework of implementing the recommendations of the "Kigali - Connect Africa Summit". The year 2012 witnessed the completion of two studies funded by the United States Agency for International Development. The first study is related to the digital divide in relation to broadband between different regions of the country, while the second study deals with a review of the Communication Code.

Tunisia works with its development partners, development banks and international organizations, to further promote the infrastructure on the basis of special studies carried out by international experts and Tunisian competencies for the development of infrastructure and the advancement of ICT sector, whether at the national, regional or international levels.

C. WSIS FOLLOW-UP

Tunisia is working to achieve the goals of WSIS Declaration of Principles (Geneva 2003) and Tunis Agenda for the Information Society (Tunis 2005) in order to build the information society in Tunisia and take full advantage of the opportunities offered by ICTs to achieve development goals, including those stated in the Millennium Declaration. In this context, within its commitment to achieve the avowed goals, Tunisia has participated in activities, whether at the national, regional or international levels.

At the national level, Tunisia created a special unit to follow up on WSIS outcomes, specifically to:

- Submit proposals to stimulate Tunisia's contribution in the achievement of the implemented plans and programs within WISIS framework at the international level;

- Coordinate between the various national stakeholders from public and private sectors, and civil society about the proposals for national positions and programs to be implemented for the completion of WISIS outcomes;
- Follow-up the implementation of WISIS programs and plan;
- In general, the unit ensures the completion of all tasks within the scope of the follow-up of WSIS,

A national committee has been founded to follow-up WSIS results. It consists of representatives from various ministries, private sector and civil society. This Commission is delegated to coordinate, monitor and follow-up WSIS unit outcomes.

At the international and regional levels, in addition to its regular participation in every special event on the follow-up of WSIS outcomes, Tunisia organizes annually, since 2006, the international event called the "ICT4ALL Forum". The "ICT4ALL Forum" is an Arab/African regional meeting platform for the various concerned parties of WSIS outcomes at regional and continental levels, it offers a space for dialogue and exchange views on the ICT technology development and to share successful experiences in the field of setting up information society.

Over time, "ICT4All Forum" has become one of the most important international events dealing with WSIS outcomes regarding the level and the number of participants, that are usually more than one thousand participants with regular participation of African and Arab Ministers. In each edition of "ICT4ALL", the organizers worked on enriching the dialogue on actual subjects in order to bring the stakeholders up to date with technological developments, in addition to the organization of several parallel events and exhibitions of services and equipments.

D. PARTICIPATION IN INTERNET GOVERNANCE ACTIVITIES

Tunisia participates regularly in the regional and international Internet governance forums, in order to contribute its vision to the various issues raised during these events. Recently, Tunisia participated in the Global Forum, held in Azerbaijan in 2012, with a high-level Tunisian delegation composed of the Minister of Information and Communication Technologies and the President of Communication Regulatory Authority. This participation has consolidated the relationship between Tunisia and the various Internet managing authorities, including ICANN. Tunisia regularly participates in the activities of the Arab Internet Governance Forum. At the regional level, Tunisia has organized the founding meeting of the North Africa IGF during ICT4ALL Forum 2012 and it is expected to appoint the Multilateral Advisory Group Members in 2013.

XI. BUILDING THE ICT SECTOR

Building the ICT sector requires public-private cooperation, in addition to the availability of many factors including investments and finance facilities, industry structure, and RDI capacities. The sector could include operators of telecommunications services, computer hardware manufacturing, software development, service provision, call centres, technical training, web design and development, digital content development and arabization, and providing electronic solutions.

A. ICT FIRMS

Given the importance of the ICT sector in social and economic development, Tunisia has developed a favourable climate to stimulate investment in this field and to encourage major international companies to launch local offices in Tunisia in order to benefit from the various privileges granted in this framework and from the availability in sufficient number of proficient human resources and manpower.

As a result of this policy, Tunisia has become one of the major destinations for "Offshoring" in the Euro-Mediterranean region and has attracted major companies operating in the field of software development and ICT services, particularly French speaking users, taking advantage of its close geographical location to many European countries, the quality of life offered by most Tunisian cities and very competitive production cost.

B. GOVERNMENT FACILITATION

Given the importance of small and medium businesses in the economy, Tunisia has encouraged the creation of these businesses through legal texts that provide a number of financial and tax incentives and simplified administrative procedures, whether in the creation or through privileged access to public procurements. The incentive legal texts, to create small and medium enterprises, include:

- Decree No 165 of 2005 on the promotion of small and medium enterprises;
- Decree No 166 of 2005 on encouraging new promoters;
- Chapter 19-A of Decree No 561 of 2008, which stipulated that each public buyer should allocate yearly 20 per cent of the estimated value of his deals for the benefit of small enterprises.

All these texts have ranked ICT in the list of the concerned fields with the granted incentives and privileges in this framework. Among the facilitations, we can also mention the Encouragement System for the creation of "Innovative ICT Enterprise", which offers the possibility for Tunisian promoters newly graduated to launch or to expand their projects of which the cost does not exceed 500 thousand dinars, including net fixed assets.

C. CONTRIBUTION OF ICT SECTOR IN THE NATIONAL ECONOMY

In 2012, the total investments in the ICT sector in Tunisia have reached, according to the report "economic balance 2013" [12] the value of 720 million Tunisian Dinars, and the sector's contribution in total investment is about 4.5 per cent. The ICT importations during 2011 were about 626 million Tunisian Dinars (1.8 per cent of total importations) while the sector's exports, ICT goods and services, reached 672 million Tunisian Dinars (2.1 per cent of total exports). Indicators have also shown that in 2012 the proportion of the sector's contribution to GDP reached 7.6 per cent, recording a growth average of 14.6 per cent. The number of ICT sector employees in Tunisia attained 82 thousand, 63 thousand of them belong to the private sector which makes the sector contribution in employment about 2.6 per cent [2].



Figure 7. Evolution of the sector's Contribution[2]





D. R&D AND INNOVATION IN THE ICT SECTOR

The Tunisian system of scientific research and technological development fits in the establishment of the knowledge society in the frame of an overall approach that intends to create an integrated development. The investment in knowledge and science is seen in Tunisia as the main source of wealth and development. The national scientific research strategy is mainly based on the completion of projects and programs with concerned economic and social parties in the field of development. Given that the ICT sector is one of the most promising sectors which sustain the national strategy in achieving development, it has been focussed on the necessity to launch a number of projects and programs in field, particularly at the level of higher education institutions and higher schools in the frame of their scientific research activities.

In this context, many units and research laboratories have been launched in most Tunisian higher education ICT institutions in accordance with the Guide Law for Scientific Research, which conduct these projects and programs in a participative way among themselves and in cooperation with public and private international laboratories using national and international finance mechanisms established for this purpose.

In line with this orientation, the strategy of the Ministry of Information and Communications Technologies has included a special section dedicated to this issue dealing with "research development by strengthening relations with industry and encouraging innovation"

The initiative of bringing technological poles and hosting higher education scientific research institutions and research centres represent one of the adopted mechanisms to facilitate the opening up of scientific research and technological development to the industrial environment and economic and private institutions. In this context, we may mention El Ghazala Technopark project for communication technologies http://www.elgazalacom.nat.tn which was established in 2000 on an area of approximately 65 hectares. This technopark provides the ideal appropriate environment for interaction between technological development institutions, research centres and higher education schools specializing in ICT. This project has been a successful experience; so that the number of institutions hosted in the Technopark, after ten years since its creation, were more than one hundred institutions operating in the fields of advanced technologies, due to the appropriate framework and the mutual interaction between research institutions and universities located in El Gazala Technopark.

E. INVESTMENTS IN THE ICT SECTOR

There is no doubt that the development of the ICT sector remains linked to the availability of investment funds. Therefore, Tunisia has provided several mechanisms to ensure necessary financial resources for the advancement of this strategic sector or to stimulate private domestic and foreign investments. This orientation is applied by contributing to projects financing and also through financial incentives like exemption from taxes. Other actions have been taken to ensure attraction of Tunisian markets

and by the legal protection of investors and investments from the different risks. Among the available mechanisms which aim to boost ICT investments, we can mention:

- ICT Development Fund, which has enabled the financiering of several infrastructure projects such as technoparks and cyberparks centers. This fund has also sponsored many "Certified Training" projects in order to strengthen job seekers skills on the one hand and to provide competent human resources in accordance with the requirements of the institutions involved in the field;
- Fund for incentives for innovation in ICTs, the beneficiaries of this fund are projects of which the cost shall not exceed 500 thousand dinars, the Fund's contribution reaches 49 per cent of the capital, provided that the contribution do not exceed 120 thousand dinars and that the investment companies shall contribute in the project capital as much as the Fund's contribution;
- Fund for Development and Industrial Decentralization, this fund contributes to financing small and medium industry and services enterprises, whose investment volume does not exceed three million dinars.

All these funds interventions are regulated under the legal texts indicating fields of application and condition of grant.

Venture capital companies contribute to the financing of several projects in Tunisia, which hosts the headquarter of the Arab Union for Venture Capital, as it hosts a large number of companies operating in this field. Most of these companies focus on ICT sector because of the cost-effectiveness that characterizes investment in this sector. In this context, we may mention "Diva Sicard" which is a venture capital company, created by the company "Tunisie Telecom" in 2009, with a capital of 20 million dinars, which operates in the field of project financing related to advanced technologies and which plays an important role in financing innovative ICT start-ups.

The total ICT investment during 2012 was about 720 million dinars, while the total investment in all sectors during the same year was about 15,976 million Tunisian dinars, which highlights the role played by ICT sector with an approximate contribution at least 4.5% of total achieved investments [2]



Figure 9. Evolution of the proportion of ICT contribution in the investment [2]

The appropriate climate for the creation and the development of ICT institutions has played an important role in the emergence of many Tunisian companies on the national and international level. Among these private companies that excelled in the ICT field, we can mention:

TELNET is a Tunisian Holding specialized in innovation and high technology consulting. Founded in 1994, TELNET quickly became a national leader. In 2011 TELNET workforce was 500 people including over 420 engineers and succeeded its introduction on the Tunis Stock Exchange and Paris Stock Exchange "Alternext" oriented to SMEs;

The "One-Tech Group" is a Tunisian holding which provides solutions in three main areas, namely cables, mechatronics and ICT. Its services cover the entire value chain: engineering, design, production, installation, and training."One-Tech Group" has many subsidiaries around the world and is quoted on Tunisia Stock Exchange.

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[7] Site of Tunisian Centre for Information Network http://www.registre.tn

- [8] Portal of Open Source Software http://www.opensource.tn
- [9] Web site of the National Center for Computer Science http://www.cni.nat.tn
- [10] Report of the National Center for Technologies in Education

[11] General Report of National Authority for the restructuring of the information and communication sector -2012

[12] Economic Balance Report For 2013

<u>Annex 1</u> Core ICT Indicators (source Ministry of ICT – Statistics Department)

Core indicator		Definitions and notes	2010	2011	2012
A1	Fixed telephone lines per 100 inhabitants	<i>Fixed telephone lines per 100 inhabitants</i> are calculated by dividing the number of fixed telephone lines by the population and then multiplying by 100. <i>Fixed telephone lines</i> refer to telephone lines connecting a subscriber's terminal equipment to the public switched telephone network (PSTN) and which have a dedicated port on a telephone exchange. This term is synonymous with the terms "main station" and "Direct Exchange Line" (DEL) that are commonly used in telecommunication documents. It may not be the same as an access line or a subscriber. The number of ISDN channels and fixed wireless subscribers are included.	12,2	11,4	10,2
A2	Mobile cellular telephone subscribers per 100 inhabitants	<i>Mobile cellular telephone subscribers per 100 inhabitants</i> are obtained by dividing the number of mobile cellular subscribers by the population and then multiplying by 100. <i>Mobile cellular telephone subscribers</i> refer to users of portable telephones subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, including IMT-2000 (Third Generation, 3G). Post-paid and prepaid subscribers are included. Prepaid subscribers are those that have used their account within a reasonable period of time. This period (e.g. 3 months) should be indicated in a note. Inactive users, which refer to owners of a prepaid card that have not made or received a call within the last 3 months, should be excluded.	104,8	115,6	118,6
A3	Fixed Internet subscribers per 100 inhabitants	<i>Fixed Internet subscribers per 100 inhabitants</i> are obtained by dividing the number of fixed Internet subscribers by the population and then multiplying by 100. <i>Fixed Internet subscribers</i> refer to the total number of Internet subscribers with fixed access, which includes dial- up and total fixed broadband subscribers: cable modem, DSL Internet subscribers, other fixed broadband and leased line Internet subscribers.	5,1	5,6	5,1
A4	Fixed broadband Internet subscribers per 100 inhabitants	Fixed broadband Internet subscribers per 100 inhabitants are obtained by dividing the number of fixed broadband Internet subscribers by the population and then multiplying by 100. Fixed broadband Internet subscribers refer to users of the Internet subscribing to paid high-speed access to the public Internet (a TCP/IP connection). High speed access is defined as being–at least 256 kbit/s, in one or both directions. Fixed broadband Internet includes cable modem, DSL, fibre and other fixed broadband technology (such as satellite broadband Internet, Ethernet LANs, fixed-wireless access, Wireless Local Area Network, WiMAX etc.) Subscribers with access to data communications (including the Internet) via mobile	4,5	5,1	4,7

Table 1 - Core indicators on ICT infrastructure and access

		cellular networks are excluded.			
A5	Mobile broadband subscribers per 100 inhabitants	 Mobile broadband subscribers per 100 inhabitants are obtained by dividing the number of mobile broadband subscribers by the population and then multiplying by 100. Mobile broadband subscribers refer to subscribers to mobile cellular networks with access to data communications (e.g. the Internet) at broadband speeds (here defined as greater than or equal to 256 kbit/s in one or both directions) such as WCDMA, HSDPA, CDMA2000 1xEV-DO, CDMA 2000 1xEV-DV etc, irrespective of the device used to access the Internet (handheld computer, laptop or mobile cellular telephone etc). These services are typically referred to as 3G or 3.5G and include: -Wideband CDMA (W-CDMA), an IMT-2000 3G mobile network technology, based on CDMA that presently delivers packet-switched data transmission speeds up to 384 kbit/s and up to 2 Mbit/s when fully implemented. It is known as Universal Mobile Telecommunications System (UMTS) in Europe. -High-speed Downlink Packet Access (HSDPA), an upgrade to W-CDMA to allow downlink data transmission at speeds of typically 8-10 Mbit/s. It is complemented by High-Speed Uplink Packet Access (HSUPA), which offers uplink speeds of around 5 Mbit/s. -CDMA2000 1xEV-DO (Evolution, Data Optimised), an IMT-2000 3G mobile network technology, based on CDMA that delivers packet-switched data transmission speeds of up to 4.9 Mbit/s. 	0,9 Only USB 3G	2,3 Only USB 3G	5,2 Only USB 3G
A6	International Internet bandwidth per inhabitant (bits/second/inha bitant)	<i>International Internet bandwidth per inhabitant</i> is obtained by dividing the amount of bandwidth (in bits/second) by the population. <i>International Internet bandwidth</i> refers to the capacity which backbone operators provide to carry Internet traffic. It is measured in bits per second.	5062	6011	8177
A7	Percentage of population covered by a mobile cellular telephone network	<i>Percentage of population covered by a mobile cellular telephone network</i> refers to the percentage of a country's inhabitants that live within areas served by a mobile cellular signal, irrespective of whether or not they choose to use it. Note that this measures the theoretical ability to use mobile cellular services if one has a cellular telephone and a subscription.	100%	100%	100%
A8	Fixed broadband Internet access tariffs (per month), in US\$, and as a percentage of monthly <i>per</i> <i>capita</i> income	<i>Fixed broadband Internet access tariffs</i> are the lowest sampled cost in US\$ per 100 kbit/s per month and are calculated from two different broadband prices, low and high speed monthly ISP charges. <i>Low speed monthly</i> <i>charge</i> refers to a typical 'entry-level' broadband lower- speed connection (download speeds of 256 – 1,024 kbit/s). <i>High speed monthly charge</i> refers to a faster and typically more expensive offer. Monthly charges do not include installation fees nor modem rentals. The <i>lowest sampled</i> <i>cost in US\$ per 100 kbit/s</i> is the most cost-effective offer for a country based on the criterion, the 'lowest cost per 100 kbit/s'. The cost per 100 kbit/s is calculated by	1,96%	1,94%	1,80%

		dividing the monthly subscription charge in US\$ by the theoretical download speed, and then multiplying by 100. <i>As a percentage of monthly per capital income</i> refers to the lowest sampled cost in US\$ per 100 kbit/s divided by the average monthly gross national income <i>per capita</i> (World Bank, Atlas method, current US\$) and expressed as a percentage. To ensure international comparability, this indicator is compiled by ITU.			
A9	Mobile cellular prepaid tariffs, in US\$, and as a percentage of monthly <i>per</i> <i>capita</i> income	Mobile cellular prepaid tariffs are based on the methodology of the OECD monthly low-user basket ¹ (version 2001), includes the cost of monthly mobile usage for 25 outgoing calls (on-net, off-net and to a fixed line) in predetermined ratios plus 30 SMS messages. As a percentage of monthly per capita income involves dividing the price of the-monthly low user basket by the average monthly gross national income per capita of the country. To ensure international comparability, this indicator is compiled by ITU.	0,87%	0,78%	0,72%
A10	Percentage of localities with public Internet access centres (PIACs)	Percentage of localities with public Internet access centres (PIACs) is computed by dividing the number of localities with at least one PIAC by the total number of the country's localities and then multiplying by 100. A public Internet access centre (PIAC) is a site, location, or centre of instruction at which Internet access is made available to the public, on a full-time or part-time basis. PIACs include tele-centres, digital community centres, Internet cafés, libraries, education centres and other similar establishments, whenever they offer Internet access to the general public. All such centres should have at least one public computer for Internet access. Localities can refer to a country's villages, towns, cities or enumeration areas used by the national statistics office for survey purposes. Note that this indicator is used to measure the WSIS target "to connect villages with ICTs and establish community access points" by 2015.			

¹ For definition, see: <u>http://oberon.sourceoecd.org/vl=15177325/cl=12/nw=1/rpsv/sti2007/ge11-1.htm</u>

Table 2 -	Core indicators on	access to, and use of	f, ICT by ho	ouseholds and in	dividuals
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Core in	ndicator	Definitions and notes	2010	2011	2012
HH1	Proportion of households with a radio	The <i>proportion of households with a radio</i> is calculated by dividing the number of in-scope households with a radio by the total number of in-scope households. A <i>radio</i> is a device capable of receiving broadcast radio signals, using popular frequencies, such as FM, AM, LW and SW. It includes a radio set integrated in a car or an alarm clock but excludes radios integrated in a mobile phone, a digital audio player (MP3 player) or in a computer.			66,6%
HH2	Proportion of households with a TV	The <i>proportion of households with a TV</i> is calculated by dividing the number of in-scope households with a TV by the total number of in-scope households. A <i>TV</i> (television) is a stand-alone device capable of receiving broadcast television signals, using popular access means such as over-the-air, cable and satellite. It excludes TV functionality integrated into another device, such as a computer or a mobile phone.	97,2%	97,6 %	97,7%
НН3	Proportion of households with telephone	The <i>proportion of households with a telephone</i> (fixed or mobile) is calculated by dividing the number of in-scope households with a telephone (fixed or mobile) by the total number of in-scope households.			95,2%
	Proportion of households with fixed telephone only	The proportion of households with a fixed telephone only is calculated by dividing the number of in-scope households with a fixed telephone only by the total number of in-scope households. A fixed telephone line refers to a telephone line connecting a customer's terminal equipment (e.g. telephone set, facsimile machine) to the public switched telephone network (PSTN) and which has a	household s with fixed telephone		0,7%
		dedicated port on a telephone exchange. This term is synonymous with the terms main station or Direct Exchange Line (DEL) that are commonly used in telecommunication documents. It may not be the same as an access line or a subscriber. The number of ISDN channels and fixed wireless subscribers is included.			
	Proportion of households with mobile cellular telephone only	The proportion of households with a mobile cellular telephone only is calculated by dividing the number of in-scope households with a mobile cellular telephone only by the total number of in-scope households. A mobile cellular telephone refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post- paid subscriptions and pre-paid accounts are included.	household s with mobile cellular telephone		71,7%

Core in	ndicator	Definitions and notes	2010	10 2011 20	
	Proportion of households with both fixed and a mobile cellular telephone				22,8%
HH4	Proportion of households with a computer	The proportion of households with a computer is calculated by dividing the number of in-scope households with a computer by the total number of in- scope households. A computer refers to a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants or TV sets.	19,1%	21%	23,2%
НН5	Proportion of individuals who used a computer (from any location) in the last 12 months	The proportion of individuals who used a computer is calculated by dividing the total number of in-scope individuals who used a computer from any location in the last 12 months by the total number of in-scope individuals. A computer refers to a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants or TV sets.	24,9%		24,6%
НН6	Proportion of households with Internet access at home	The proportion of households with Internet access at home is calculated by dividing the number of in-scope households with Internet access by the total number of in-scope households. The Internet is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.	11,4%	14,3%	17,1%
HH7	Proportion of individuals who used the Internet (from any location) in the last 12 months*	The <i>proportion of individuals who used the Internet</i> is calculated by dividing the total number of in-scope individuals who used the Internet (from any location) in the last 12 months by the total number of in-scope individuals. The <i>Internet</i> is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.). Access can be via a fixed or mobile network.	36,8%	39,1%	41,4%

Core indicator		Definitions and notes	2010	2011	2012
HH8	Location of individual use of the Internet in the last 12 months	The proportion of individuals who used the Internet at each location can be calculated as either: the proportion of in-scope individuals or the proportion of <u>Internet</u> <u>users</u> , using the Internet at each location.			
	hiohths	Access to the internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.			
		Individuals should be asked about all locations of Internet use (that is, the survey question used by countries should specify multiple responses ²). Note that, except for mobile access, the locations are associated with the equipment used e.g. a PC installed at work or at an Internet café.			
	Home		51,8%		63,5%
	Work	Where a person's workplace is located at his/her home, then he/she would answer yes to the home category only.	19,4%		18,4
	Place of education	For students. Teachers and others who work at a place of education, would report 'work' as the place of Internet use. Where a place of education is also made available as a location for general community Internet use, such use should be reported in the <i>Community Internet access facility</i> category.	27%		17,5%
	Another person's home	The home of a friend, relative or neighbour.	18%		16,4%
	Community Internet access facility	Internet use at community facilities such as public libraries, publicly provided Internet kiosks, non- commercial tele-centres, digital community centres, post offices, and other government agencies (such as schools); access is typically free and is available to the general public.	8,5%		8,5%
	Commercial Internet access facility	Internet use at publicly available commercial facilities such as Internet or cyber cafés, hotels, airports etc, where access is typically paid (i.e. not free of charge).	40,4%		30,4%
	Any place via a mobile cellular telephone	Use of the Internet at any location via a mobile cellular telephone (including handheld devices with mobile phone functionality).	5,9%		13,9%
	Any place via other mobile access devices	Use of the Internet at any location via other mobile access devices, e.g. a laptop computer or handheld device that uses wireless access (at a WiFi 'hotspot') or a laptop computer connected to a mobile phone network.	4%		19,3%

^{(*) :} administrative source - data about the use of the Internet through fixed networks.

² Some countries may ask about location of use as a series of yes/no questions, each referring to one location of use.

Core in	dicator	Definitions and notes	2010	2011	2012
HH9	Internet activities undertaken by individuals in the last 12 months (from any location)	The proportion of individuals who undertook each activity can be calculated as either: the proportion of in- scope individuals or the proportion of <u>Internet users</u> who undertook each activity. Note that these activities are restricted to private purposes and therefore exclude activities such as purchasing over the Internet undertaken as part of a person's job. Individuals should be asked about all Internet activities (that is, the question used by countries should specify multiple responses. Activities are not mutually exclusive. Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.			
	Getting information about goods or services		14,3%		17,7%
	Getting information related to health or health services	Includes information on injury, disease, nutrition and improving health generally.	19,6%		24,1%
	Getting information from general government organizations	General government organizations should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA " the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non- market production." (General) government organizations include central, state and local government units.	16,1%		16,4%
	Interacting with general government organizations	Includes downloading/requesting forms, completing/lodging forms on line, making on-line payments and purchasing from government organizations. It—excludes getting information from government organizations. <i>General government organizations</i> should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA " the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in nonmarket production." (General) government units.	19,3%		17,3%
	Sending or receiving e-mail		66,6%		71,3%

Core indicator	Definitions and notes	2010	2011	2012
Telephoning over the Internet/VoIP	Using Skype, iTalk, etc. Includes video calls (via webcam)	56,6%		68,1%
Posting information or instant messaging	Posting messages or other information to chat sites, blogs, newsgroups, online discussion forums and similar; use of instant messaging.	69,8%		65%
Purchasing or ordering goods or services	Refers to purchase orders placed via the Internet whether or not payment was made on line. Orders that were cancelled or not completed are excluded. Includes purchasing products, such as music, travel and accommodation bookings, etc. via the Internet.	4,9%		7,1%
Internet banking	Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information. Excludes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance.	7,9%		9,2%
Education or learning activities	Refers to formal learning activities such as study associated with school or tertiary education courses as well as distance education involving on-line activities. (A more narrow interpretation is likely to be less meaningful as it could include a range of activities such as using the Internet to search for information.)	39,1%		40,7%
Playing or downloading video games or computer games	Includes file sharing games and playing games on line, either paid or free of charge.	39,7%		44,5%
Downloading movies, images, music, watching TV or video, or listening to radio or music	Includes file sharing and using web radio or web television, either paid or free of charge.	47,7%		53,6%
Downloading software	Includes downloading of patches and upgrades free of charge.	32,4%		32,3%
Reading or downloading on- line newspapers or magazines, electronic books.	Includes accessing news websites, either paid or free of charge. Includes subscriptions to on-line news services.	24,1%		30,3%

Core in	ndicator	Definitions and notes	2010	2011	2012
HH10	Proportion of individuals with use of a mobile cellular telephone	The proportion of individuals with use of a mobile cellular telephone is calculated by dividing the total number of in-scope individuals with use of a mobile cellular telephone by the total number of in-scope individuals.	67%		72,4%
		A mobile cellular telephone refers to a portable telephone subscribing to a public mobile telephone service using cellular technology, which provides access to the PSTN. This includes analogue and digital cellular systems, as well as IMT-2000 (3G). Users of both post-paid subscriptions and pre-paid accounts are included. Use of a mobile cellular telephone does not mean that the telephone is owned or paid for by the person but should be reasonably available through work, a friend or family member, etc. It excludes occasional use, for instance, borrowing a mobile phone to make a call.			
HH11	Proportion of households with access to the Internet by type of access (narrowband, broadband (fixed, mobile))	This indicator should be calculated as the proportion of in-scope households with Internet access that use each type of access service, for instance, the proportion of households with Internet access that use a broadband service as their means of access. It is expected that countries will collect data at a finer level than 'narrowband' and 'broadband'. The categories chosen by countries should allow aggregation to total narrowband and total broadband, as well as fixed and mobile broadband, as defined below.			
		As households can use more than one type of access service, multiple responses are possible.			
	Narrowband	<i>Narrowband</i> includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services include CDMA by (Palease Q), CRPS, WAP and i mode	14,7%		6,4%
	Fixed broadband	<i>Fixed broadband</i> refers to technologies such DSL (Digital Subscriber Line) at speeds of at least 256kbit/s, cable modem, high speed leased lines, fibre-to-the-home, powerline, satellite, fixed wireless, Wireless Local Area Network and WiMAX.	79,2%		68,3%
	Mobile broadband	Mobile broadband access services include <i>Wideband</i> <i>CDMA</i> (W-CDMA), known as <i>Universal Mobile</i> <i>Telecommunications System</i> (UMTS) in Europe; High- speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 2000 1xEV-DV. (See A5). Access can via any device (handheld computer, laptop or mobile cellular telephone etc.).	8,5%		28,9%

Core indicator		Definitions and notes	2010	2011	2012
HH12	Frequency of individual use of the Internet in the last 12 months (from any location)	The <i>frequency of individual use of the Internet</i> can be calculated as: either the proportion of in-scope individuals or the proportion of <u>Internet users</u> , <u>using</u> the Internet with each frequency. It is recommended that countries collect this information in respect of a typical period; therefore, respondents should ignore weekends (if they only use the Internet at work) and breaks from their usual routine, such as holidays. Access to the Internet is not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.			
	At least once a day	Once a working day for respondents who only (or most frequently) use the Internet from work.	51,2%		61,4%
	At least once a week but not every day		39,9%		32,2
	Less than once a week		8,9%		3,5%
Referen	nce indicator				
HHR 1	Proportion of households with electricity	Electricity is not an ICT commodity, but is an important prerequisite for using many ICTs. It is therefore included in the core list as a reference indicator. Electricity access may be by a grid/mains connection, or from power generated locally (including at the dwelling). Local power includes electricity generated by a fuel-powered generator, or from renewable resources such as wind, water or solar. It excludes sole use of energy storage devices, such as batteries (though these may be used to store electricity from other sources).	99,7%	99,8%	99,8%

Table 3. Core indicators on use of ICT by businesses

Core i	ndicator	Definitions and notes	2009	2010	2011	2012
B1	Proportion of businesses using computers	The proportion of businesses using computers is calculated by dividing the number of in-scope businesses using computers during the 12-month reference period by the total number of in-scope businesses. A computer refers to a desktop or a laptop computer. It does not include equipment with some embedded computing abilities such as mobile cellular phones, personal digital assistants or TV sets.	83,3%			
B2	Proportion of persons employed routinely using computers ⁱ	The proportion of persons employed routinely using computers is calculated by dividing the number of persons employed routinely using computers (in all in-scope businesses) by the total number of persons employed (in all in-scope businesses). Persons employed refer to all persons working for the business, not only those working in clerical jobs.	19,7%			

Core i	ndicator	Definitions and notes	2009	2010	2011	2012
		They include short-term and casual employees, contributing family workers and self-employed persons, who may be paid or unpaid.				
B3	Proportion of businesses using the Internet	The proportion of businesses using the Internet is calculated by dividing the number of in-scope businesses using the Internet by the total number of in-scope businesses. The Internet is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.). Access can be via a fixed or mobile network.	70,5%			
B4	Proportion of persons employed routinely using a computer with access to the Internet ³	The proportion of persons employed routinely using a computer with access to the Internet is calculated by dividing the number of persons employed routinely using a computer with access to the Internet (in all inscope businesses) by the total number of persons employed (in all in-scope businesses).	14,5%			
B5	Proportion of businesses with a web presence	The proportion of businesses with a web presence is calculated by dividing the number of in-scope businesses with a web presence by the total number of in-scope businesses. A web presence includes a website, home page or presence on another entity's website (including a related business). It excludes inclusion in an on-line directory and any other web pages where the business does not have control over the content of the page.	30,5%			
B6	Proportion of businesses with an intranet	The proportion of businesses with an intranet is calculated by dividing the number of in-scope businesses with an intranet by the total number of in- scope businesses. An intranet refers to an internal communications network using Internet protocols and allowing communication within an organization (and to other authorized persons). It is typically set up behind a firewall to control access.	33,2%			
B7	Proportion of businesses receiving orders over the Internet	For international comparability, the <i>proportion of businesses receiving orders over the Internet</i> is most simply calculated by dividing the number of in-scope businesses receiving orders over the Internet by the total number of in-scope businesses. Alternatively,	10,3%			

³ Note that this indicator is not equivalent to the employment weighted indicator 'proportion of persons employed working in businesses with Internet access'.

⁴ Note that this indicator is not equivalent to the employment weighted indicator 'proportion of persons employed working in businesses with Internet access'.

Core i	ndicator	Definitions and notes	2009	2010	2011	2012
		output can be presented as the proportion of in-scope businesses using the Internet.				
		<i>Orders received</i> include orders received via the Internet whether or not payment was made on line. They include orders received via websites, specialized Internet marketplaces, and extranets, EDI over the Internet, Internet-enabled mobile phones and email. They also include orders received on behalf of other organizations – and orders received by other organizations on behalf of the business. <i>Orders received</i> exclude orders that were cancelled or not completed.				
B8	Proportion of businesses placing orders over the Internet	For international comparability, the <i>proportion of businesses placing orders over the Internet</i> is most simply calculated by dividing the number of in-scope businesses placing orders over the Internet by the total number of in-scope businesses. Alternatively, output can be presented as the proportion of in-scope businesses using the Internet.	12,6%			
		<i>Orders placed</i> include orders placed via the Internet whether or not payment was made on line. They include orders placed via websites, specialized Internet marketplaces, and extranets, EDI over the Internet, Internet-enabled mobile phones and email.				
		<i>Orders placed</i> exclude orders that were cancelled or not completed.				
B9	Proportion of businesses using the Internet by type of access (narrowband	This indicator should be calculated as the proportion of in-scope Internet-using businesses that use each type of access service, for instance, the proportion of Internet-using businesses that use a broadband service as their means of access.				
	(fixed, mobile))	level than 'narrowband' and 'broadband'. The categories chosen by countries should allow aggregation to total narrowband and total broadband, as well as fixed and mobile broadband, as defined below.				
		As businesses can use more than one type of access service, multiple responses are possible.				
	Narrowband	<i>Narrowband</i> includes analogue modem (dial-up via standard phone line), ISDN (Integrated Services Digital Network), DSL at speeds below 256kbit/s, and mobile phone and other forms of access with an advertised download speed of less than 256 kbit/s. Note that narrowband mobile phone access services	4,5%			
		include CDMA 1x (Release 0), GPRS, WAP and <i>i</i> -mode.				
	Fixed broadband	Fixed broadband refers to technologies such as DSL (Digital Subscriber Line) at speeds of at least 256kbit/s, cable modem; high speed leased lines, fibre-to-the-home, powerline, satellite, fixed wireless, Wireless Local Area Network and WiMAX.	66%			

Core i	ndicator	Definitions and notes	2009	2010	2011	2012
	Mobile broadband	Mobile broadband access services include <i>Wideband</i> <i>CDMA</i> (W-CDMA), known as <i>Universal Mobile</i> <i>Telecommunications System</i> (UMTS) in Europe; High-speed Downlink Packet Access (HSDPA), complemented by High-Speed Uplink Packet Access (HSUPA); CDMA2000 1xEV-DO and CDMA 2000 1xEV-DV. Access can be via any device (mobile cellular phone, laptop, PDA, etc.)	-			
B10	Proportion of businesses with a local area network (LAN)	The <i>proportion of businesses with a LAN</i> is calculated by dividing the number of in-scope businesses with a LAN by the total number of in-scope businesses. A <i>local area network</i> (LAN) refers to a network connecting computers within a localized area such as a single building, department or site; it may be wireless.	52%			
B11	Proportion of businesses with an extranet	The proportion of businesses with an extranet is calculated by dividing the number of in-scope businesses with an extranet by the total number of in- scope businesses. An extranet is a closed network that uses Internet protocols to securely share a business' information with suppliers, vendors, customers or other businesses partners. It can take the form of a secure extension of an Intranet that allows external users to access some parts of the business' Intranet. It can also be a private part of the business' website, where business partners can navigate after being authenticated in a login page.	6,2%			
B12	Proportion of businesses using the Internet by type of activity	The proportion of businesses that undertook each activity can be calculated as: either the proportion of in-scope businesses or the proportion of Internet- using businesses that undertook each activity. For international comparability, output is most simply presented as the proportion of in-scope businesses undertaking each activity, for instance, the proportion of businesses using the Internet for sending or receiving emails. An alternative presentation is the proportion of business Internet users undertaking each activity. The <i>Internet</i> is a world-wide public computer network. It provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer – it may also be by mobile phone, games machine, digital TV etc.). Access can be via a fixed or mobile network. Businesses should be asked about all Internet activities (that is, the question used by countries should specify multiple responses). Activities are not necessarily mutually exclusive.				
	Sending or receiving e-mail	·	63,5%			

Core indicator	Definitions and notes	2009	2010	2011	2012
Telephoning over the Internet/VoIP, or using video conferencing	Using Skype, iTalk, etc. Includes video calls (via webcam)	20,8%			
Use of instant messaging, bulletin boards		-			
Getting information about goods or services		59,8%			
Getting information from general government organizations	<i>General government organizations</i> should be consistent with the SNA93 (2008 revision) concept of general government. According to the SNA " the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes; to redistribute income and wealth by means of transfers; and to engage in non-market production." (General) government organizations include central, state and local government units.	48,1%			
Interacting with general government organizations	Includes downloading/requesting forms, completing/lodging forms on line, making on-line payments and purchasing from, or selling to, government organizations. It excludes getting information from government organizations.	30,4%			
Internet banking	Includes electronic transactions with a bank for payment, transfers, etc. or for looking up account information.	29,9%			
Accessing other financial services	Includes electronic transactions via the Internet for other types of financial services such as share purchases, financial services and insurance.				
Providing customer services	Customer services include providing on-line or emailed product catalogues or price lists, product specification or configuration on line, after sales support, and order tracking on line.				
Delivering products on line	Delivering products on line refers to products delivered over the Internet in digitized form, e.g. reports, software, music, videos, computer games; and on-line services, such as computer-related services, information services, travel bookings or financial services.	5,3%			
Internal or external recruitment	Including having details of vacant positions on an intranet or website.	4,8%			
Staff training	Includes e-learning applications available on an intranet or from the WWW.	5,2%			

Core in	ndicator	Definitions and notes	2010	2011	2012
ICT1	Proportion of total business sector workforce involved in the ICT sector (expressed as a percentage)	 <i>ICT workforce</i> (or ICT employment) consists of those persons employed in businesses that are classified as belonging to the ICT sector. <i>Total business workforce</i> represents all persons engaged in domestic production in the business sector. In a national accounts framework, employment can be measured in terms of headcounts, jobs, full-time equivalents (FTE) or hours worked. For countries using ISIC Rev. 3/Rev 3.1 (or national equivalents), the ICT sector is defined per the OECD's 2002 definition. This can be found in Box 1 and is discussed in detail in OECD (2007). For countries using ISIC Rev. 4 (or national equivalents), the ICT sector is defined per the OECD's 2007 definition. This can be found in Box 1 and is discussed in detail in OECD (2007). For countries using ISIC Rev. 4 (or national equivalents), the ICT sector is defined per the OECD's 2007 definition. This can be found in Box 2 and is discussed in detail in OECD (2007). The total business sector is defined on an activity (industry) basis per ISIC Rev. 3.1 as divisions 10–67 and 71–74. It therefore excludes: agriculture, hunting, forestry and fishing; real estate activities (because a significant proportion of the value added of the latter consists of imputed rent of owner-occupied dwellings); and, community, social and personal services (which consists mainly of non-market activities such as public administration, education and health services). For countries using ISIC Rev. 4, the total business sector is not so easily defined. It will most likely include the equivalent divisions 05 to 36, 41-66, 69-82 and 95. Discussions are ongoing on whether it should include some industries that were not included in the Rev. 3.1 definition of the total business sector (divisions 37-39, 90-93 and 96).⁴ 	2,2%	2,6%	
ICT2	ICT sector share of gross value added (expressed as a percentage of total business sector gross value added).	<i>Gross value added</i> for a particular industry represents its contribution to national GDP. It is sometimes referred to as GDP by industry and is not directly measured (but is estimated in a national accounts framework). In general, it is calculated as the difference between production (gross output) and intermediate inputs (the energy, materials and services required to produce final output). See also Table 7. Definitions of the ICT and total business sector are per ICT1.	5,9%	6,4%	6,7%

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Core in	ndicator	Definitions and notes	2010	2011	2012
ICT3	ICT goods imports as a percentage of	<i>ICT goods</i> are defined per the OECD's 2003 ICT goods classification, based on the 1996 and 2002 Harmonized System classification. It can be found in UNCTAD (2007).	1,9%	1,9%	1,7%

⁴ See draft ISIC Rev. 4: <u>http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27</u>.

Core indicator		Definitions and notes	2010	2011	2012
	total imports	Other concepts are per the <i>UN COMTRADE</i> database e.g. re-exports and re-imports are not netted out, and data are presented in US dollars (converted by the UN from country currencies).			
ICT4	ICT goods exports as a percentage of total exports	<i>ICT goods</i> are defined per the OECD's 2003 ICT goods classification, based on the 1996 and 2002 Harmonized System classification. It can be found in UNCTAD (2007). Other concepts are per the <i>UN COMTRADE</i> database e.g. re-exports and re-imports are not netted out, and data are presented in US dollars (converted by the UN from country currencies).	2,6%	2,8%	2,7%

Table 6 - Core indicators on ICT in education

Core ind	icator	Definitions and notes	2010	2011	2012
ED1	Proportion of schools with a radio used for educational purposes (by ISCED level 1 to 3)	Schools offering radio-based education as a percentage of the total number of schools in the country for each ISCED level (1-3).			
ED2	Proportion of schools with a TV used for educational purposes (by ISCED level 1 to 3)	Schools offering television-based education as a percentage of the total number of schools in the country for each ISCED level (1-3).			
ED3	Proportion of schools with a telephone communication facility (by ISCED level 1 to 3)	Schools with telephone communication facilities as a percentage of the total number of schools in the country for each ISCED level (1-3). Note that the facility should be directly associated with the school. For instance, a mobile phone which is owned by an individual working at the school would not constitute a school <i>telephone communication facility</i> .			
ED4	Student-to-computer ratio (by ISCED level 1 to 3)	Average number of students per computer in schools that offer computer-assisted instruction (CAI) by each ISCED level (1-3).	15,2 (Level 2-3)	14,9 (Level 2-3)	
ED5	Proportion of schools with Internet access, by type (by ISCED level 1 to 3)	Schools with access to the Internet as a percentage of the total number of schools in the country for each ISCED level (1-3).	51,2 (Level 1 to 3) 99,8 (Level 2-3)	54 (Level 1 to 3) 99 (Level 2-3)	
ED6	Proportion of students who have access to the Internet at school (by ISCED level 1 to 3)	Total number of students with access to the Internet in schools as percentage of the total number of students in schools offering internet- assisted instruction in a given country by each ISCED level (1-3).			

Core ind	icator	Definitions and notes	2010 2011		2012	
ED7	Proportion of students enrolled by gender at the tertiary level in ICT-related fields (for ISCED levels 5 and 6)	Number of students currently admitted in ICT-related fields ⁵ by gender as a percentage of all students enrolled in educational institutions in a given country by gender for ISCED levels 5 and 6 (combined).	16,3	16		
ED8	Proportion of ICT-qualified teachers in primary and secondary schools	Number of primary and secondary teachers who have received ICT training, expressed as a percentage of the total number of teachers at these levels of education.	13,3 (Level 1) 39,7 (Level 2-3)	13 (Level 1) 39,6 (Level 2-3)		
Reference indicator						
EDR1	Proportion of schools with electricity (by ISCED level 1 to $3)^6$	Schools with electricity as a percentage of the total number of schools in the country for each ISCED level (1-3).	100	100	100	

Classificatory variables

The main classificatory variable used for the ICT in education indicators is the 1997 version of ISCED (the International Standard Classification of Education, maintained by UNESCO). ISCED recognizes several levels of education as follows:

ISCED 1 – Primary education or first stage of basic education;

ISCED 2 – Lower secondary or second stage of basic education;

ISCED 3 – Upper secondary education;

ISCED 4 – Post-secondary non tertiary education (programmes that lie between the upper-secondary and tertiary levels of education);

ISCED 5 – First stage of tertiary education (not leading directly to an advanced research qualification);

ISCED 6 - Second stage of tertiary education (leading to an advanced research qualification).

⁵ ICT-related fields include computer science, computer engineering, information and communication technology, information systems, multimedia systems, ICT management, system support and software development, informatics, etc. These are represented by ISCED97 Fields of Study 48-Computing, together with elements of 21-Arts (audio-visual, media production and design) and 52-Engineering (electronics and automation). These fields involve substantial work in understanding the technical aspects of ICT rather than a more generic or basic use of ICT.

⁶ Since electricity is not specifically an ICT commodity, but an important prerequisite for using many ICTs, it is not included in the core list, but included as a reference indicator. International studies reviewed by UIS revealed that the lack of electricity is such a significant barrier in many developing economies that monitoring trends of its provision is as relevant as monitoring the supply and use of ICT.

Table 7 - C	ore indicators	on ICT i	n government
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Core indi	cator	Definitions and notes	2010	2011	2012
EG1	Proportion of persons employed in central government organizations routinely using computers	The proportion of persons employed in central government organizations routinely using computers is calculated by dividing the number of persons employed in central government organizations, who routinely use computers, by the total number of persons employed in central government organizations. The result is then multiplied by 100 to be expressed as a percentage. An optional indicator may be calculated separately for male and female persons employed (or other individual characteristics).			
EG2	Proportion of persons employed in central government organizations routinely using the Internet	The proportion of persons employed in central government organizations routinely using the Internet is calculated by dividing the number of persons employed by central government organizations, who routinely use the Internet, by the number of persons employed by central government organizations. The result is then multiplied by 100 to be expressed as a percentage. An optional indicator may be calculated separately for male and female persons employed (or other individual characteristics).			
EG3	Proportion of central government organizations with a Local Area Network (LAN)	The proportion of central government organizations with a Local Area Network (LAN) is calculated by dividing the number of central government organizations with a LAN by the number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage.			
EG4	Proportion of central government organizations with an intranet	The proportion of central government organizations with an intranet is calculated by dividing the number of central government organizations with an intranet by the number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage.			
EG5	Proportion of central government organizations with Internet access, by type of access	The proportion of government organizations with Internet access, by type of access is calculated by dividing the total number of central government organizations with Internet access (by each type of access and 'any' access) by the total number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage. Note that the sum of percentages of each type of access is likely to exceed 100, as many central government organizations will have more than one type of access service.			
EG6	Proportion of central government organizations with a	The proportion of central government organizations with a web presence is calculated by dividing the number of central government			

Core indicator		Definitions and notes	2010	2011	2012
	web presence	organizations with a web presence by the number of central government organizations. The result is then multiplied by 100 to be expressed as a percentage.			
EG7	Selected Internet-based services available to citizens, by level of sophistication of service	Unlike indicators EG1 to EG6, this indicator refers to both central and state/provincial levels of government. This is necessary to ensure international comparability as the services selected may be offered by different levels of government across countries. Because the approach taken to measuring Internet-based services is relatively untested5 and because responses may be somewhat subjective, the indicator is initially considered to be 'experimental'. The indicator is weighted by population in order to show the significance of government Internet- based services at the national level. The indicator is expressed in terms of the percentage of a country's population that is theoretically able to access each Internet-based service. Note that this does not refer to whether a citizen has the equipment or knowledge necessary to access those services or whether s/he needs to access those services or whether s/he directly benefits (for example, most of the services are not relevant to children). The ability to access each service will usually be linked to the relevant jurisdiction, for example, a citizen residing in a particular state will theoretically be able to access Internet-based services offered by that state government, though may not need to, wish to, or be technically capable of doing so.			

ⁱ Note that this indicator is not equivalent to the employment weighted indicator 'proportion of persons employed working in businesses with a computer'.