ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA (ESCWA)

NATIONAL PROFILE OF THE INFORMATION SOCIETY IN THE UNITED ARAB EMIRATES

United Nations

CONTENTS

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LIST OF ABBREVIATIONS

aeCERT	the UAE Computer Emergency Response Team
AII	Arab Innovation Index
AUS	American University of Sharjah
BSI	British Standards Institution
CERT	The Centre for Excellence for Applied Research and Training
DIC	Dubai Internet City
DSO	Dubai Silicon Oasis
eHDF	eHosting DataFort
EIDA	The Emirates Identity Authority
EIM	Emirates Internet and Multimedia
EMI	Emirates Media Incorporated
FOG	The Fiber Optic Gulf
FNOC	The FLAG Network Operations Centre
GCC	Gulf Co-operation Council
GFH	Gulf Finance House
ICT	Information and Communication Technology
IDB	Islamic Development Bank Group
IDN	Internationalized Domain Names
IFIC	Iran Foreign Investment Corporation
ISI	the Information Society Index
IT	Information Technology
MOFI	Ministry of Finance and Industry
MoH	Ministry of Health
NGN	Next Generation Network
NAP	Network Access Point
PPP	Public Private Partnerships
SMBs	Small and Medium Businesses
TECOM	Technology E-Commerce & Media Free zone
TRA	Telecommunications Regulatory Authority
WHO	The World Health Organization

Introduction

The United Arab Emirates (UAE) is a union of seven sovereign sheikhdoms, formed when the British withdrew from the Gulf in 1971. With a relatively small area (83,600 sq km), the population has reached 4.7 million as estimated in 2006 (UNDP). The UAE's per capita GDP is on par with those of some West European nations ($27,610 in 2006)[1].

The national government is a federation with specified powers delegated to the UAE federal government and other powers reserved to member emirates, which explains the huge difference in accepting and utilizing ICTs in the different emirates. Dubai, followed by Abu Dhabi, is considered the most advanced of the seven Emirates. The 2006 Gross Domestic Product reached US$ 177 billion[2].

The UAE is one of the most technologically sophisticated countries in the Middle East. At the heart of the growing information technology market, the UAE IT sector grew from US$ 6.9 billion in 2003 to more than US$ 9.5 billion in 2005[3].

The country has achieved significant accomplishments in building the foundations for an information/knowledge-based society. By providing an enabling legal and regulatory framework combined with the existence of national data and advanced communications infrastructure, important progress has been made in diversifying the economy away from full dependence on petroleum exports. This has stimulated commercial success among a wide variety of businesses, including global, regional, local SMEs, and locally based international companies such as the Thuraya Satellite Telecommunications[4], and well-capitalized indigenous government supported telecommunication companies, and a world-class free trade zone. Identified as the regional ICT hub in the region, Dubai is a leading city in adopting technology. The Dubai Technology E-Commerce & Media Freezone (TECOM), which was established in 2000, has a total of 680 companies (from IT and Telecom sectors). TECOM is also home to Dubai Internet City, Dubai Media City, and Dubai Knowledge Village. The UAE has fared very well on the front of technology according to the World Economic Forum's Arab World Competitiveness Report 2007[5]. The technological readiness ranks UAE 27th on a world scale in Information and Communication Technology (ICT). The technological readiness, which is a sub-component of the Global Competitiveness Index, measures firm-level technology absorption, laws relating to ICT, FDI and technology transfer, mobile telephone subscribers, Internet users and personal computer. The 2006 Growth Competitive Index, which is a composite of macroeconomic environment, state of public institutions, and technology readiness, ranks UAE 19th in the world with a score of 5.06 and second on the list among the Gulf Co-operation Council (GCC) countries[6].

The UAE enjoys has a divertive and competitive economy due to maintaining a business-friendly environment coupled with good infrastructure and internationally competitive labor cost. The introduction of competition into the UAE telecommunications market and the continued demand for additional services by a sophisticated domestic and expatriate market will continue to grow the market for ICT products and services. The UAE infrastructure and the indigenous companies are world-class and demand the latest technology and services.

In addition to commercial activities, considerable success has been made in integrating information and communications technologies into governmental processes. Most government ministries have interactive on-line presence, and a national initiative is under way to increase the number and breadth range of services

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[1] Source: UNFPA, IMF, UNDP

2 Source: UNFPA, IMF, UNDP

3 DIC Corporate Presentation (http://www.dubaiinternetcity.com/press_centre/corporate_presentation/)

4 www.thuraya.com

5 The Arab World Competitiveness Report 2007

6 economix.u-paris10.fr/pdf/colloques/2006_droit/Mia_2.pdf

available on-line. These efforts have resulted in the UAE being ranked highest among all ESCWA member countries in e-Government readiness by the United Nations, and the highest on the Arab Innovation Index published by INSEAD (Arab Innovation Index, 2007).

I. THE ROLE OF THE GOVERNMENT AND ALL STAKEHOLDERS

A. NATIONAL INFORMATION SOCIETY POLICIES AND E-STRATEGIES

While an explicit national plan of action for building the Information Society has been published only in 2005[7], the ongoing commitment of UAE to developing a robust ICT sector is clear. Many international indicators point to the UAE accomplishments in this regard, in addition to the many initiatives undertaken by the government to boost ICT infusion and diffusion in the country. The United Arab Emirates has taken a quantum leap during the past 15 years in the direction of liberalizing its economy and diversifying it away from the oil-based sector. The 2006-2007 Networked Readiness Index, a joint project by INSEAD and the World Economic Forum, which evaluates the relative level of ICT development in 104 countries, ranked the UAE 29th (with an index of 4.42).[8] Sound economic management has contributed to stabilizing the macroeconomic environment and strengthening public institutions. Areas of concern, though, include educational accomplishment, in particular at the primary and secondary levels. These need to be dealt with on a priority basis by decision makers.

In 2007, the Index of Economic Freedom, a joint project by the Heritage Foundation and the Wall Street Journal, ranked the UAE 74th worldwide, the 7th among the Arab states after Bahrain (40th), Jordan (53rd), Oman (54th), Kuwait (57th), Tunisia (69th) and Qatar (72nd).[9] This index measures how well a country scores on a list of 50 variables divided into 10 areas of economic freedom. These include trade policy, banking regulations, fiscal burden, foreign investment codes, monetary policy, and black market. The various measures and incentives created by the government have helped the country move steadily and consistently into the direction of an information/knowledge based society.

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

Based on a legislative mandate provided at the federal level in resolution number 631/1,[10] the UAE is pursuing a deliberate path to incorporate ICT in government services. This plan calls for approximately 90% of government services to be available by telephone (including fixed and mobile lines) and Internet services by the end of 2007. Commercial partners assisting in the implementation of these efforts include Oracle and Microsoft. A number of public private partnerships (PPP) initiatives have been undertaken by the government and various private sector entities such as HP, Microsoft and Intel; the latest is Intel *Teach to the Future* Initiative with the Abu Dhabi Government; Intel® Teach to the Future is a worldwide effort to help both experienced teachers and Pre-Service teachers integrate technology into instruction to develop students' higher-level thinking skills and enhance learning. Teachers participating in this initiative receive extensive training and resources which help them promote the use of effective technology in the classroom. The training provides new approaches to align teaching lessons with educational learning goals and standards. In addition, the program integrates the use of Web page design, the Internet, and student projects as a medium to powerful learning. The pilot program in the UAE commenced in Abu Dhabi Education Zone in September 2006 and it is now in the evaluation phase.

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[7] 2006-2010 General Policy for ICT in the UAE.

[8] The Global Information Technology Report, 2006-2007. Published by the World Economic Forum and INSEAD.

[9] The Index of Economic Freedom (2007). The Wall Street Journal and the Heritage Foundation, New York, N.Y.

[10] The Federal Government of the UAE has issued resolution (No 631/1) on the development and implementation of E-government. This project aims to improve the effectiveness and efficiency of administration and delivery of services in all government entities within the Federal Government.

C. ROLE OF NON GOVERNMENTAL ORGANIZATIONS

Non Governmental Organizations working to help diffuse ICT in the UAE are almost non existent; however, a number of public sector entities are involved in concrete projects to move the UAE into the maturity stage of an information/knowledge based society. Most of these projects are centered on educational institutions and governmental sectors such as the K-12 educational system of public schooling (Intel Teach to the Future Initiative); Higher colleges of technology, Cisco initiative at a number of universities (UAE university and American University of Sharjah); Microsoft initiative with the computer literacy driving license (University of Sharjah); and Oracle Educational initiative (American University of Sharjah).

D. PROGRESS TOWARDS FULFILLMENT OF NATIONAL POLICIES AND STRATEGIES

The UAE consistently ranks very highly when measured by the criteria provided in documents such as the WSIS plan of action, the UNDP human development report, and the ISI index. While the UAE present development is not specifically tuned to the metrics provided in these documents, their achievements in areas such as telephone and mobile penetrations, personal computers and Internet diffusion and infusion and societal integration of ICT perform very well under these indicators of achievement. The latest feather in the cap of the UAE is its ranking as the country that is positioned to become the region's innovation hub, according to the Arab Innovation Report which measures the degree to which Arab companies are responding to the challenge of innovation. The report finds that the UAE is four times more likely than its closest rival, Egypt, to become the dominating innovation influence in the Arab world. The report resulted form a collaboration between Moutamarat, the leading French business school INSEAD, and consultant PricewaterhouseCoopers.

II. ICT INFRASTRUCTURE

A. INFRASTRUCTURE

While the federal Government has not drawn up a comprehensive national strategy for its information society until recently, very advanced strategies have been in place and have been implemented at the local (emirate) level, particularly in Dubai and Abu Dhabi. The UAE has a modern telecommunications infrastructure, especially when compared to other countries in the region. It has frequently been referred to as the "most wired" state in the Middle East. UAE residents have relatively unhindered access to all modes of communications that Western, advanced nations do. May be it is worth mentioning here, that discrepancies exist between population living in the cities and those living in rural areas; however, local governments are trying to narrow the gap by enacting training and development programs in rural areas; a case in point is the host of various educational and training programs undertaken by the Emirate of Sharjah in areas such as Kalba and Dhaid.

The telecommunication infrastructure has been owned and operated as a monopoly by Etisalat until 2006, when Du, a new competitor, came into the market. After years of generating excess revenues and returns via national monopoly, Etisalat is now faced with a competitive operating environment for the first time. While the UAE owns a majority stake at 60% of Etisalat, individual UAE nationals own 40% of the company. The Corporation is ranked by *Financial Times* as one of the top 500 companies in the world in terms of market capitalization and the sixth largest in the Middle East. In its recent ranking the *Financial Times* ranks Etisalat 138 among the *Financial Times'* top 500 Corporations (AMEInfo, 2006). In 2000, Etisalat initiated a subsidiary ISP called Emirates Internet and Multimedia (EIM). Since that time, Etisalat created e-Company, which resells all Internet and data transport services. Furthermore, and because of the impressive infrastructure capacity of the UAE, several other regional ISPs purchase communication services from the Etisalat network.

The regulatory body of ICT in the UAE is the Telecommunications Regulatory Authority (TRA) which was established according to the UAE Federal Law by Decree No. 3 of 2003 – Telecom Law. The main objectives of the TRA may be summarized as ensuring adequacy of telecommunications services throughout the UAE; achieving enhancement of services, both in terms of quality and variety; ensuring quality of service and adherence to terms of licenses by licensees; encouraging telecommunications and IT services within the UAE; promoting and enhancing the telecommunications sector within the UAE; promoting and developing the telecommunications sector in the UAE by training, development and the establishment of relevant training institutions; resolving any disputes between the licensed operators; establishing and implementing a regulatory and policy framework; promoting new technologies; ensuring that the UAE becomes the regional ICT hub; developing the country's human capital; and encouraging ICT research and development.

The UAE has a comparatively high telephone penetration rate. Within the UAE Etisalat has a fixed exchange line capacity of 1.4 million telephone lines – 100 percent digital – of which around 50,000 are ISDN in addition to the leased circuits. The number of fixed-line telephone connections increased from 1,136,000 lines in 2003 to 1,310,000 in 2006, which represents a penetration of 30.3 lines per 100 inhabitants.[11] The UAE also boasts one of the highest rates of mobile line distribution in the ESCWA region with 5,519,000 subscribers in 2006, compared with 4,534,000 in 2005. High quality Internet services are available, featuring dial-up, ADSL, ISDN, Frame relay, ATM, leased line, and satellite options. Basic dial-up service costs US$ 0.486 per minute for peak usage and US$ 0.27 for off-peak usage. The total bandwidth available for the country has increased from 1.024 Gbps in 2003 to 2.680 Gbps in 2005 and to 10 Gbps in 2006. Combined with a personal computer dissemination estimated at 16.2%, growing at a projected average rate of 14% per year, the Internet services available have enabled the growth of the information/knowledge-based society in the UAE. An additional example of this trend can be seen in the growth of registered domains under the national country code. These registered domains have increased from 12,261 in 2004 to 54,871 in 2007.

Table 1. Number of Fixed Telephone Lines

Year	Number (000)
1997	835
1998	915
1999	975
2000	1,020
2001	1,053
2002	1,094
2003	1,136
2004	1,188
2005	1,237
2006	1,310

Source: TRA 2007

Table 2. Number of Mobile Subscribers

Year	Number (000)
1997	313
1998	492
1999	830
2000	1,428
2001	1,909

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[11] TRA, 2007.

2002	2,428
2003	2,972
2004	3,683
2005	4,534
2006	5,519

Source: TRA 2007

Table 3.   Penetration Rates for Fixed Line, Mobile and Internet

Year	Population	Fixed Line Penetration	Mobile Penetration	Internet Penetration
1997	2,681,514	31.1	11.5	2.5
1998	2,827,926	32.4	17.4	5.9
1999	2,982,330	32.7	27.9	10.6
2000	3,145,165	32.4	45.4	16.8
2001	3,316,891	31.7	57.6	19.9
2002	3,497,983	31.3	69.4	21.9
2003	3,688,984	30.8	80.6	25.5
2004	3,890,402	30.5	94.7	30.5
2005	4,106,427	30.1	110.5	32.2
2006	4,326,832	30.3	127.6	39.5

Source*: TRA 2007*

Table 4. UAE Registered Domains

Year	.ae Domains
2004	12,261
2005	20,791
2006	34,517
2007	54,871

Source: TRA 2007

Further investment in the telecommunications network is a continuing priority for the national government. In 2006, expenditures of US$2.5 billion were devoted to expansion, improvement and maintenance of the infrastructure (IDC, 2006). As part of this expansion of services, an ambitious project has been implemented which aims at delivering voice, high-speed data, and broadcast television to consumers through a single cable-based modality. The Fiber Optic Gulf (FOG) project consists of a 1,300-kilometer long fiber optic cable link between UAE, Qatar, Kuwait and Bahrain. FOG links the UAE to Kuwait via Qatar and Bahrain, and it has a transmission capacity of 10 Gbps (billions of bits per second) per fiber pair and SDH technology will enable the system to accommodate enormous volumes of traffic, making possible broadband ISDN, Internet, Video-On-Demand and other new services. The Fiber Optic Link Around the Globe Cable System (FLAG) project connects Europe to South Asia via UAE. The FLAG Network Operations Centre (FNOC) is set up in Fujairah, which positions it in the midpoint of the cable system. The other cables that connect the UAE are South East Asia –Middle East – Western Europe 3 and 4 cable systems (SEA-ME-WE3 and SEA-ME-WE4). The total length of the SEA-ME-WE3 and SEA-ME-WE4 cables is approximately 39,000 km[12] and 20,000 km respectively, while their capacities are 40 Gbps and 1280 Gbps[13].

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[12] www.seamewe3.com

[13] www.seamewe4.com

Etisalat serves over 5.5 million mobile customers in the UAE, with a penetration rate of over 109 per cent.[14] In 2005, Etisalat announced revenues of AED 12.9 billions and net profits of AED 4.3 billions (Etisalat Annual Report, 2005); the corporation finished 2006 with another year of outstanding financial performance whereas consolidated revenues grew by 27 % to AED 16.3 billion. The company also offers fixed line services over the next generation network (NGN), and has been migrating sections of its users onto the advanced network. The timeline for completion of migration is the end of 2007. By establishing NGN, Etisalat will be able to offer voice, video, and data over one single source, enabling true Triple-Play functionality SMS 2 Fax & SMS 2 e-mail is a unique and convenient way to send SMS text messages to a fax number and to an e-mail address. The facility allows GSM customers (post-paid & prepaid) to send a text message with a maximum of 160 characters from their mobile to a fax number and to an e-mail address. Mobile telephony has made giant stride in the UAE in a relatively short time, beating fixed-line telephony. The telecommunication sector in the UAE has undergone extensive development. At the end of 2001, there were 1.9 million GSM users indicating 62 percent penetration rate, which is compatible to the most advanced countries in the world. Compared to other countries of the Gulf Cooperation Council (GCC), which has a 2005 mobile penetration rate of 38.16 percent, the UAE penetration rate is more than double and stands on par with many Western European nations. Similarly, a 31.23 percent fixed line penetration rate and 39.11 percent Internet penetration rate place the country squarely at the top of the list, and among leading nations worldwide in telecommunications. In absolute numbers, the UAE accounts for slightly more than 16 percent of mobile phones in the Arab world. In addition, the UAE mobile phone penetration rate is well above that of the world average, which stands at 26 percent (ITU, 2005).

At the end of 2005, the UAE had 31,000 Web-hosting customers, up from 4500 customers in 2001[15]. In April 2005, Etisalat introduced the latest developments in manufacturing cards like 3G cards and the latest technology implemented in manufacturing WASEL[16] and GSM cards, all of which reflect Etisalat's success in offering best services for its customers. The new SIM card has an EEPROM memory capacity of 64 Kb and it supports GSM functionality. These features make it an ideal SIM card platform to migrate from 2G to new 3G services. As the new SIM card complies with both GSM and 3G requirements, all the mobile services offered today can be accessed with this new card. The card enables the operator to offer a wide range of value added services such as m-commerce, m-banking, as well as information, entertainment, and gaming services. The 3G is a multi-application and multi-standard card supporting both ETSI and ISO standards. This makes it easy to implement different types of services on a single card. 3G cards offer an open application toolkit platform to develop new applications and services (Etisalat, 2006).

Table 6. Internet Subscribers (Number "000")

Year	Dialup	Broadband	Total
1997	27	0	27
1998	66	0	66
1999	130	0	130
2000	209	1	211
2001	256	8	264
2002	290	18	309
2003	317	30	347
2004	363	56	418
2005	399	129	529
2006	443	241	683

Source: Etisalat Yearbook 2006

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[14] The usual caveat applies here concerning the uniformity of distribution of this diffusion rate between rural and urban areas.

[15] www.Etisalat.co.ae

[16] WASEL is a prepaid phone service.

The Federal Government is also increasing all activities relating to the dissemination and spread of awareness through supporting national media and conferences. Finally, almost all local and national daily newspapers have a dedicated section for spreading public ICT Knowledge. The main problem, however, and based on observation, the percentage of readership is minimal.

B. INVESTMENTS IN ICT INFRASTRUCTURES AND DEVELOPMENT OF NEW SERVICES

ICT infrastructure is very well developed in the UAE as evidenced by its ranking on the Information Society Index (ISI); the new feather on the cap of the UAE in 2006 is the establishment of a new telecommunications provider, *du*[17]*;* that will increase competition and will, eventually, lead to an economically efficient telecommunications s industry. In addition, the major development in the legal and regulatory environments will create an environment, which will entice and attract foreign ICT investments.

As an initiative that will promote ICT in the region, the UAE developed an ICT fund to provide targeted funding and advisory services to companies, organizations, business incubators and individuals to empower them to develop the innovation and knowledge capital of the UAE ICT sector with their research, education and entrepreneurship. The Fund promotes entrepreneurship and improves linkage between industry and academia to ultimately promote the involvement of UAE nationals in scientific and technology research to foster self-reliance of the UAE in technology. ICT Fund is a new venture dedicated to advancing the sector both regionally and globally and shares the UAE's commitment to innovation and progress in R&D projects as well as support education and training in the field.

Injazat Technology Fund E.C. is a USD 50 million Venture Capital Fund operating in compliance with Shari'a principles and targeting technology companies within the MENA region under the motto "From the region for the region". The Fund was initiated by the Islamic Corporation for the Development of the Private Sector (ICD), an affiliate of the Islamic Development Bank Group (IDB), and by Gulf Finance House (GFH), in partnership with Dubai Islamic Bank (DIB), Saudi Economic and Development Company (SEDCO), and Iran Foreign Investment Corporation (IFIC).

Injazat was founded on the idea that it takes teamwork, experience, strategic thinking, and resources to turn early stage ventures into solid companies. The Fund strives to add experience and expertise to invention in order to support technological companies in the regional marketplace.

Injazat frequently takes active roles as the lead investor, contributing the necessary resources and management support that are vital to a young company's growth. The Fund is committed to creating strategic business partnerships, which facilitate and foster success in business. Injazat invest intellectually and financially in people with the vision and drive required to turn growth companies into accelerating companies.Injazat's portfolio includes 8 companies: AOMEBroad Link Research Ducont FZ LLC (www.ducont.com) Ejada (www.ejada.com.sa) Omnix Media Networks (www.omnix-group.com), Promedia (www.promediasystems.com), Rubicon (www.rubicon.com.jo), and Specialized Technical Services (STS) Group (www.sts.com.jo).

C. ICT CONNECTIVITY

The UAE had been an regional leader in ICT connectivity; almost all schools, private and public are wired; schools and universities administer exams online; college applications are done online; possibly an area where the UAE can improve on is the development of community centers. Unfortunately, these are missing and adding them would offer a great service especially to the marginalized segment of the population; mainly the expatriate communities. In addition, ubiquitous computing and wireless services are

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[17] Pronounced as "doo", www.du.ae

abound; only this month (May 2007) Commuters will be able to reserve taxis using the short message service (SMS) from their mobile phones; to facilitate the implementation of this initiative, the RTA will install small boards with location code numbers and a taxi sign on them.

D. ICT EQUIPMENT AND SERVICES

The UAE does not have a federal level initiative to tackle the issue of accessibility and affordability of ICT services, especially to people with disability, children and elderly. However, there are modest initiatives at the levels of the emirates, such as the one initiated the Sharjah City of Humanitarian Services where top of the line ICT equipment are made available to teacher and students who are mentally and physically challenged.

E. INTERNET GOVERNANCE

Investment in the telecommunications network is a continuing priority for the federal government; in 2004, a total investment of US$ 371.662 was made in telecommunications and in 2006, a total of US$ 2.5 billion were invested in IT related projects. Emirates Internet Exchange (EMIX) – an Etisalat division – is the first Network Access Point (NAP) in the Middle East offering IP transit connectivity to ISPs in the region. EMIX is developing its network to meet the future requirements of ISPs in the region by increasing its total bandwidth to cater for customer demand when required. Currently, EMIX Network consists of 81 STM-1[18] compared to 15 in 2004. The Network is connected across the globe via Fiber Optic links to Europe, Far East and USA through SEA-ME-WE-3, SEA-ME-WE-4 and FLAG cables.

The increase in bandwidth and the upgrade of equipments which have warranted such significant investments in infrastructure have been done with a view to ensure an unmatched quality of service and a world class Internet experience to consumers in the UAE. This capacity expansion with increased links to major global Internet hubs will benefit customers by helping to avoid disconnection to the Internet in the event of any disruption and ensure that traffic is re-routed to other links if disruptions occur in a particular link/path.

F. TRADITIONAL MEDIA

As will be discussed later in this report, Emirates Media Incorporated (EMI) plays an important role in development of the media in the UAE. Most printed media incorporate the latest information technology modules; given the UAE's diversified populations, a mix of TV viewing content is required to address the need of the various language based and ethnic groups. Therefore, E-Vision offers a variety of viewing on its more than 200 channels. Viewing content was localized by introducing Dubai and Abu Dhabi live stock market quotes and adding to the popular e-Masala Movie schedule. In addition, E-Vision is strategically placed to make the most of the convergence of telecommunications and TV entertainment services; in the last quarter of 2006, for instance, "IP TV" was introduced. This technology provides information, communication and interactive content over a single network providing the customer with choices far beyond that of traditional TV viewing. Services are being provided over a very advanced high capacity network connecting in excess of 350,000 homes in the UAE via Broadband Wireless Access or through Hybrid Fiber Coaxial Cables. Mobile customers, in the very near future, will be able to have access to these services using Etisalat's 3G and GPRS networks.[19]

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[18] *www.emix.ae*

[19] Etisalat 2006 Yearbook.

III. ACCESS TO INFORMATION AND KNOWLEDGE

A. PUBLIC DOMAIN INFORMATION

The UAE government is strongly committed to raising people awareness of the benefits of information and communication technologies, and of giving access to all people to information and knowledge almost instantaneously. Individuals, organizations and communities should benefit from access to knowledge and information. Ministries such as Labor have implemented the system of e-signature, e-work permits, etc.

A prime indicator of the movement towards an information/knowledge society is the information society index (ISI).[20] Some of the GCC countries have emerged as forerunners in the Arab region and are among the 50 top information technology (IT) users in the world, based on the ISI classification issued by the United States' IDC Group. In its global Information Society Index (ISI) for 2006,[21] the World Times/IDC ISI ranks the UAE 32nd, and Saudi Arabia 47th overall out of 53 countries, by evaluating 23 indicators measuring the capacity of a nation's citizenry to exchange information internally and externally. These 23 indicators are classified into four different categories: (1) Computer Infrastructure; (2) Internet Infrastructure; (3) Information Infrastructure; and, (4) Social Infrastructure (World Times and International Data Corporation, 2006). The Index measures the country's achievements in IT and related fields, the level of use and its readiness to cope with IT developments. Only four Arab countries are listed among the top 53 countries in information technology readiness. The 53 countries included in the ISI index account for more than 98 percent of total IT investment in the world. The ISI establishes a standard by which all nations are measured according to their ability to access and absorb information and information technology. While GDP measures economic wealth, ISI measures information capacity and wealth. The ISI is designed to help countries assess their position relative to other countries and to guide companies to future market opportunities.

B. ACCESS TO INFORMATION AND PUBLIC INFORMATION

The UAE is committed to transforming the society into an information/knowledge base society; as such the computer penetration rate as well as the Internet diffusion rate is comparable to those of developed countries in Western Europe. The Federal government is also increasing all activities related to the dissemination of knowledge and the spread of awareness through supporting national media and conferences. The e-Library[22] is a government supported imitative whereby its services are provided through collaboration between Dubai eGovernment and Dubai Municipality – Public Libraries section. It integrates all Dubai libraries (currently nine) and acts as a unified interface through which the user can search for publications and documents through the available databases such as Dubai Municipality, Dubai Police, Civil Defense and others. It is worth noting that the Department of Health and Medical Services - Government of Dubai, has also launched a Medical E-Library[23] containing a wealth of Medical related documents and publications accessible to its staff and customers.

More work is still needed though on providing access of the technology to the majority of the population.

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[20] Please refer to Karake Shalhoub, Z. (2006). "Trust, privacy and security in e-business: the case of the GCC." *Information Mgt. and Computer Security*, 14(3): 270-283.

[21] The 2006 World Times/IDC Information Society Index: Measuring the Global Impact of Information Technology and Internet Adoption is the seventh installment of the Information Society Index (ISI) research.

[22] http://elibrary.dubai.ae

[23] http://web.dohms.gov.ae/medlib/

C. MULTI PURPOSE COMMUNITY PUBLIC ACCESS POINTS

Free access to the Internet is readily available in schools, universities and public libraries; however, a lot needs to be done to accomplish a high level of infusion and diffusion in this area. Some initiatives undertaken by the TRA; such as the ICT Development Fund established in 2005 are very promising. The Fund, the first of its kind in the Middle East, has the target goals to develop the ICT industry, foster R&D, encourage capacity building, and enhance education and training in the field of ICT. Moreover, this initiative will sponsor and organize ICT-related events and partner with leading international R&D institutions. The Fund will be financed by payments from the primary licensed operators in the amount of 1% of their revenues. Other sources of income may include government and/or private grants, returns from ICT Fund investments, potential income from patents and other intellectual property derived from ICT Fund projects, in addition to any other sources approved by the TRA

D. USING DIFFERENT SOFTWARE MODELS

Many different software models are being used, especially by private businesses in the UAE. Recent experimentation with Open Sourcing has started, especially in a number of educational institutions such as the American University of Sharjah and the United Arab Emirates University.

IV. ICT CAPACITY BUILDING

A. BASIC LITERACY

Over 55 percent of the population in the UAE is under the age of twenty-five, with an estimated literacy rate of close to 78 percent (CIA Fact book 2007). While there is no federal program to combat illiteracy, many local programs at the level of the individual emirates exist. The Emirate of Sharjah has been very creative in utilizing ICT to combat illiteracy through the use of computer based instructions in remote areas such as Kalba.

In general, the UAE is characterized as a "*literacy abundant country*". As of October 2006, and for the age group 15-24, the UAE attained a literacy rate of 90%, well above the world average of 87.6%. As with respect to gender parity, the UAE scored 1.07 for the age of 15 and above.[24]

The UAE does not have a formal program where ICT is used to eradicate illiteracy; however, as already mentioned in the report, many initiatives have been undertaken at the level of the various emirates, especially in Abu Dhabi, Sharjah and Dubai.

B. ICT IN EDUCATION AND TRAINING

The UAE government is very serious about the incorporation of ICT into training and education; a comprehensive program to incorporate ICT into education was developed.

While a strategy at the Federal level is yet to be developed, many of the emirates have adopted their own ICT training programs, especially in the public sector. A number of partnerships between the private and the public sectors are pushing in this direction. An example of such an initiative is the announcement in January 2007 by Dubai Internet City of the formation of a new IT group aimed at strengthening ties between the government and the private sector. The Dubai IT Association, co-founded by IT heavyweights such as Microsoft, Hewlett-Packard and Nokia, will attempt to drive further the development of technology in the UAE economy. Also, it will strive to broaden the role of IT in society to groups such as women, students, and the unemployed.

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[24] Please refer to Hammoud, 2006.

As a forum and headquarters to coordinate industry initiatives, the group will address key issues such as combating piracy, developing a local workforce of IT professionals, and increasing broadband penetration rates. Other founding members include 3M, Dupont, Market Vision, Sun Microsystems and Intel.

The UAE Government and the Ministry of Education are committed to promoting the use of ICT in education throughout the whole supply/value chain; i.e. from K-12 to vocational to higher education. Three years ago, the author of this document was appointed by the then Minister of Education, Dr. Ali Al Sharhan, to chair a committee whose purpose was to draft an action plan to incorporate ICT in the K-12 educational system; the document was completed and delivered after two years, and awaiting implementation.

In addition, many educational initiatives, supported by the private sector, are being implemented; companies such as HP, Microsoft, Oracle, Cisco, and Intel have been engaged in a number of initiatives aimed at increasing awareness of the use of ICT on the social and economic fronts.

Many high schools as well as colleges and universities have adopted, and mandated, the use of Lap Tops by students; Al Mawakeb School in Dubai has been a pioneer in this area mandating the use of laptops for all students in grade 9 through 12 since 2001. UAE University in the Al Ain, Zayed University both in Dubai and Abu Dhabi and American University of Sharjah (AUS) require all students to be equipped with laptops; in addition, some universities like AUS have elected to use iLean (Blackboard) as a learning management system (LMS) for examination and testing.

C. TRAINING PROGRAM FOR CAPACITY BUILDING IN THE USE OF ICT

A number of training programs for capacity building in the use of ICT have been developed at the levels of the emirates (especially Abu Dhabi, Sharjah and Dubai). A number of universities and educational institutions have been designated as training centers and testing facilities for ICDL (Zayed University and Sharjah University). Serious initiatives at the Federal level are under consideration at the time of this writing.

Vocational training outside of the traditional educational framework is also available; however, it is still at the infancy stage. A number of public and private sector entities are developing in house ICT training programs for their employees; others, yet, outsource this function to training institutes which are abundant all around the country. Dubai Media, for instance, have mandated that by the end of 2007, all journalists have to be computer literate and are required to submit their reports electronically. The major challenge here is identifying scarce and needed skills and developing appropriate training programs.

D. RESEARCH AND DEVELOPMENT

The efforts of research and development in the communication and information sectors are concentrated in research centers and universities where most UAE universities make basic and applied research in the field of communication and computers in the existence of mature Faculties of Computers Science and Management Information Systems. In addition to the major universities, there are currently tens of colleges and universities in Dubai Knowledge Village, most of these are satellite campuses to well known European, Australian and American Educational institutions.

Dubai Internet City (DIC) provides a strategic and cost effective platform for ICT companies targeting emerging markets in a vast region extending from the Middle East to the Indian subcontinent, and from Africa to Central Asia. Dubai Internet City is a strategic base for companies targeting emerging markets in a vast region extending from the Middle East to the Indian subcontinent, and Africa.

Launched in the year 2000, DIC now features a dynamic international community of ICT companies including global giants like Microsoft, Cisco Systems, IBM, HP, Dell, Siemens, Sun Microsystems, Computer Associates, PeopleSoft and Sony Ericsson. Many small and medium businesses (SMBs) and

promising entrepreneurial ventures are also part of the community. The cluster comprises companies from a variety of sectors - Software Development, Business Services, Web Based and e-Commerce, Consultancy, Sales and Marketing and Back Office. DIC provides an environment that attracts all elements of the ICT value chain, and has developed several programs that can be leveraged by the community to explore and expand channel development opportunities. Companies are privy to an advanced Metro Ethernet broadband infrastructure and a range of business-enabling services including government transactions. DIC also has the world's largest commercial IP Telephony network.

Currently, Dubai Internet City (DIC), the six-year-old IT and telecoms free zone, is evaluating a proposal to boost research and development, which will increase its attractiveness as a regional marketing hub. The proposal, part of DIC's growth plans, could include the creation of a fund which would focus on investing in knowledge initiatives to create talent pools and regulatory changes. Dubai Internet City houses some 850 firms, including global giants like GE, Intel, Samsung and Huawei, who mainly use it as a marketing and sales hub for the Middle East, Africa and South Asia. A small amount of software development also takes place there.

Dubai Silicon Oasis (DSO) is another shining star whereby it is operating as an incubator comprising state of the art office towers, R&D and industrial zones, and educational institutions providing a dynamic commercial and social environment. The Oasis has an IP library; high–speed Internet access; high end IT infrastructure; efficient transport and distribution facilities; and state of the art telecommunications infrastructure. Facilities there include a Microelectronics Innovation Center; fabrication plants, and R&D laboratories.

Dubai Silicon Oasis is a 100% government owned Technology Park that was completed in 2006. Its 7.2 sq km master–planned community strategically located in Dubai is the only free zone designed as an integrated community which includes the construction of 560 residential villas. With the aim to attract global semi-conductor manufacturers to relocate to Dubai, it is part of Dubai Government's vision to transform the emirate into a knowledge economy.

"If everything works out as planned, we would attract between US$2 to US$4 billion in total investment at the DSO. We have already signed up with 80 companies which will soon go up to 100 in the coming months and bring in between 1,000 to 1,500 qualified professionals, designers and engineers at the DSO,"[25] Last year, DSO had signed up with LSI Logic, a US$2 billion company to invest in DSO. According to Gulf News, DSO is in negotiations with four major semi-conductor players to have a presence here, while 10 smaller manufacturers are in the pipeline.

DSO is an innovation-driven technology community, housing microelectronics- and optoelectronics-related enterprises, a state-of-the-art Microelectronics Innovation Centre, fabrication plants, research and development centers and specialized academic institutions and residential areas. According to Emirates News Agency - WAM, investments in the high-tech design and manufacturing industry at the 7.2 million square meter technology park are estimated to exceed US$10 billion over a period of 20 years.

Dubai Biotechnology and Research Park (Dubiotech) is another centre of excellence in biotechnology, bridging research, education, and industry through national and international collaboration to create, develop and advance research and development in the region. Its vision to foster biotechnology education, training and industry support and offer highly developed multifaceted infrastructure and facilities. Dubiotech also aims to create and provide a supportive legal and regulatory environment and build knowledge based bio-economy for the region; create an environment for every stakeholder in the biotech industry to coexist and collaborate; and encourage innovation through educational grants, and research funds.

An indication of the high investment in R&D in ICT is the ranking of the UAE as the top innovator on the Arab Innovation Index. This index is developed by INSEAD with the support of Moutamarat and PricewaterhouseCoopers.

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[25] According to Jurgen Knorr, chief executive of Dubai Silicon Oasis Authority (DSOA)

V. BUILDING CONFIDENCE AND SECURITY IN THE USE OF ICTS

A. USE OF ELECTRONIC TRANSACTIONS AND DOCUMENTS

Building institutional mechanisms is the best tool offered to citizens to help increase confidence and trust in the use of ICTs. The UAE has been a pioneer in the Middle East in creating a "rule of law" to govern electronic transactions. Law No 2 of 2006 includes 29 articles. The law considers any intentional act resulting in destroying or revealing secrets or republishing personal or official information as a crime. Anyone found logging into an information website or system shall be punished with jail term or fine, or both. The law also states that anyone found luring a male or female to commit adultery or prostitution through the Internet would be jailed up to five years and fined.

A number of creative initiatives have been undertake to encourage the move from a paper-based into a paperless environment; an example of such initiative is the Civil Engineering Department's (CED) Paperless Initiative of Dubai Ports, Customs and Free Zone Corporation (PCFC); the initiative was triggered when the amount of paper that was being handled had reached enormous proportions. In line with Dubai's development, workload in CED increased manifold with a corresponding increase in "paper load". Under the guidance of Eng. Nazek Al Sabbagh,[26] Chief Civil Engineering Officer at CED, one of the first steps CED took in this initiative was to have automation of core business processes in place, which would reduce the dependency on papers. As a result of this initiative, the CED implemented the following:

- E-Permit, which takes care of full document handling and workflow management associated with Building Permit applications. All drawings and other documents are received as digital files and all correspondence between CED, Consultants and Clients are thru Internet and e-mail;

- E-Site: a PDA and GIS based system used by Site Inspectors visiting construction sites, who receive all relevant details including location maps online on their handheld devices with no need to carry papers;

- E-Map, which brings a wealth of Geographic information to the desktop computers of any authorized staff member of PCFC thru a user-friendly web interface;

- E-Bidding: a new product enabling effective negotiations with bidders of large construction projects, which, in addition to reducing papers, is expected to bring the contract value down.

Whereas these electronic products have eliminated the use of paper within the department, the massive amount of archived information on paper that were stored in huge filing rooms are scanned and now stored in online storage systems.

Some of the direct benefits of this initiative have been:

- Reduced office space and storage spaces, which saves on rent;

- Reduced Stationary expenditure;

- Reduced Building Permit approval time from 3, 4 days to few minutes;

- Reduced time for Project Documentation from 4 days to 4 hours and comments consolidation time reduced from 21 days to 7 days.

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[26] Nazek's efforts have not gone unrecognized; in 2006, she was the recipient of the Emirates Businesswomen Award for Innovation.

B. ONLINE TRANSACTION SECURITY

Just on April 5th, 2007, the UAE's Telecom Regulatory Authority has tasked a new group, the UAE Computer Emergency Response Team (aeCERT), with fighting cybercrime in the country, given the growing problems surrounding cybercrime in the region. A quick start to operations has been promised, as aeCERT should come online by the end of 2007. The team will begin operation by the fourth quarter of this year. It will be comprehensive and help prevent much Internet crime. The UAE lately has been the focus of attention regarding cybercrime in the Gulf, as a large cyberfraud gang offering bogus services from the Dubai International Finance Centre was dismantled. Even more recently the authorities thwarted a hacking attempt on the Dubai eGovernment computer network (Kranokov, 2007). However, much has also been done to safeguard online safety in the country with the adoption of the anti-cybercrime laws in 2006. The establishment of the new crime-fighting group is another step in the right direction for the UAE.

C. COUNTERING MISUSE OF ICTs

Currently, cultural, religious and political considerations require that pornography, gambling, and drugs websites be blocked. The development of the regulatory environment and the institutional mechanisms in the UAE is testament to the continuous effort of the federal government to counter the misuse of ICT. The United Arab Emirates Computer Emergency Response Team (aeCERT) is the cyber-security coordination Center in the UAE. This is being established by the TRA as an initiative to facilitate the detection, prevention and response of cyber security incidents on the Internet. The mission of the aeCERT is to sustain a resilient and vigilant ICT infrastructure against a broader set of cyber security threats and to build a secure and safe cyber culture in the UAE. The aeCERT will: (1) enhance the cyber security law and assist in the creation of new laws; (2) enhance information security awareness across the UAE; (3) build national expertise in information security; (4) provide a central trusted point of contact for cyber security incident reporting in the UAE; and (5) establish national center to disseminate information about threats, vulnerabilities and cyber incidents.

The 2006 Cybercrime Law, at a glance:

- Article No 3 states that anyone found breaking rules stipulated in Article No 2 of the law shall be sentenced to no less than one year in jail and/or fined not less than Dh 20,000,

- Article No 4 states that anyone found forging any document of federal or local government shall be temporarily imprisoned and/or fined,

- Article No 5 of the law states that anyone convicted of hampering computer program or services shall be punished with a jail term and/or a fine.

This law also defines hacking and the penalty associated with this activity; the law states that anyone found fleecing money by using the internet or any high-tech means, and anyone using data of credit card or assuming the identity of another person will be sentenced to no less than one year and/or fined no less than Dh 30,000.

D. PRIVACY AND DATA PROTECTION

Privacy is still a foreign concept in the UAE culture. This is an area that has to be addressed at the Federal level in order to increase trust in digital means and tools and lead to increase in online business. It is worth mentioning that Article 14 of Federal Law No 3/2003 states that "The Telecommunications Regulatory Authority shall have the power to issue regulations, orders, resolutions and procedures in relation to use of consumer information."

E. INFORMATION SECURITY AND NETWORK SECURITY

A recent report by auditing giant KPMG[27] shows that companies in the UAE are failing to take a holistic approach to their long-term information security planning are instead, increasingly depending on their IT department. Most of these companies are not considering international security standards such as ISO 27001 when implementing information security management systems; such standards would be required as these companies expand on a regional and global scale.. Moreover, the report shows that organisations need to treat security and continuity issues as business issues and embed them in the larger context of risk management policies and procedures." According to the report, viruses were the main issue in 2006, followed by spamming and internal threats.

IV. ENABLING ENVIRONMENT

A. LEGAL AND REGULATORY ENVIRONMENT

Until 2006, the UAE' telecommunications market had been effectively monopolized by a single state-controlled company, Etisalat, that operated all information and communications networks in the country, served all communications service users, and acted as the de-facto regulatory body for telecommunications. The country was bound by commitments to the World Trade Organization (WTO) to liberalize the telecommunications sector by the end of 2005, and new legislation adopted in 2004 resulted in the creation of a new "independent" regulator, the Telecommunications Regulatory Authority (TRA). A second national public telecommunications operator was established later in 2005, with its backers coming from the UAE public sector, although it was not able to begin operating until the second half of 2006. There are currently no plans to liberalize other segments of the market. In the local press, Etisalat has indicated that it is preparing for liberalization, with Internet telephony a market it is watching with particular interest. However, the TRA has decided to legalize the activities of any VoIP operators in the country in two phases. In the first phase, the permits licensed operators in the UAE to provide VoIP services under light obligations. In the second phase, the TRA will issue a full regulatory framework. Currently the operators block illegal VoIP traffic on the Internet in compliance with TRA rules and regulations.

Federal Law No. 1 of 2006 concerning Electronic Transactions and Commerce Law and Federal Law No. 2 of 2006 (the Cyber Crime Law) were issued earlier in June 2006 under the decree of President His Highness Sheikh Khalifa Bin Zayed Al Nahyan. The new laws lay the foundation for legitimizing e-commerce and fighting misuse of cyberspace and new technologies. The federal laws reflect the UAE government's commitment to provide legal protection for Internet related investments and ensure that the legal system meets the challenges of the digital economy. The new laws represent a bold initiative from the UAE government. For the implementation of these laws to be effective, however, it is critical for the corporate community to be aware of their implications. Only then will the efficiency of the laws be tested.

The Federal laws have introduced a number of international standards while at the same time extended the relevance of existing laws to the electronic domain. With the rising threat of cyber crimes, especially identity theft, it is important to raise awareness about the legal recourse that companies have in the event of any incident. The new legislation provides a sound platform on which to build the regulatory framework. It does not, however, address some aspects of e-commerce and electronic transactions such as privacy, jurisdiction, data protection, domain names, and decency. The UAE government needs to promulgate more cyber laws to fill gaps in the existing legislation so that the legal system is able to meet the needs of the evolving digital economy.

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[27] http://www.itp.net/news/8175-security-shines-in-uae

The law also creates a business and regulatory environment in which technology-based, electronic commerce, Internet and media companies will be able to operate globally out of the UAE with significant competitive advantages over local and regional competitors.

B. SECURE STORAGE AND ARCHIVAL

In November 2005, a new initiative to create industry standards for commercial websites was announced. The Arab Internet Standards Organization (InterStandards) initiative has the mission of accelerating the development of the region's Internet industry by developing a set of new standards in e-marketing, e-design, e-content, e-security, and e-solutions for commercial websites[28].

Supported by DIC and eHosting DataFort (eHDF), the initiative seeks to structure these benchmarks through a certification program that adheres to British Standards Institution (BSI) standards. The standards will be promoted among the industry through a comprehensive marketing program to be conducted in association with DIC and eHDF.

These standards will act as guidelines for quality in the Web development sector and serve as unified industry benchmarks for evaluating Internet websites. They will also help create a rich environment for the Internet industry to thrive and grow and help accelerate the development of the Internet industry in the UAE and the region. It is expected that InterStandards will address the various inadequacies plaguing the Arab world's Internet industry. Very few Internet portals in the world follow the right standards for structure and design. Poor online payment security in the world and lack of online product lines and fulfillment logistics on Internet portals are hampering the development of e-commerce. Very few portals follow industry regulations for traffic analysis and banner management to create a proper e-marketing medium. Very few portals also offer genuine content and use the right technology. This new initiative will work to address and drive quality in each of these areas.

C. DOMAIN NAME MANAGEMENT

Etisalat plays the key role in domain name management; for instance, Etisalat is hosting two mirror root name servers F and K in Dubai and Abu Dhabi. Theses servers are meant to increase the response time domain name resolution in the UAE as well as in the region. This is a step initiated by Etisalat, to strengthen the root name server network by providing more points of mirror servers to deflect malicious attacks on the foundation of the Internet.

The TRA will lead the restructuring of the UAE domain name industry and establish an independent .ae Domain Administration (.aeDA) to promote the .ae name space and transition to worlds's Best Practices operation for the .ae ccTLD. The .aeDA's mission is to provide secure access, stability and reliability to the domain names registered under the .ae ccTLD domain, thus ensuring their sustainable growth. The .aeDA will establish a new industry framework to redefine the roles of each involved entity and open up the the competition between different registrars. In supporting the growth of the .ae ccTLD, the .aeDA will make required changes to the .ae namespace to enhance its openness and accessibility while retaining the strong cultural identity of the UAE.

In addition, Etisalat/UAEnic is co-founder of the Arabic Domain Name Project (Trial). It is participating along with the GCC and Arab countries in testing the Arabic characters in domain names. The system consists of Root name servers in Dubai and Riyadh on trial basis. This project was initiated in step to enable the Arab community to access websites in their native language i.e. Arabic. It was presented to ICANN in step to update the root name servers with IDNs to enable the accessibility worldwide.

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[28] AMEinfo, November 23, 2005

D. Standardization of ICT

The Arab Internet Standards Organization (InterStandards) initiative, mentioned above is a step in the right direction. The InterStandards have five standardization modules:

1. e-design and structure module;
2. e-marketing module;
3. e-media/content module;
4. e-security module; and
5. e-solutions/Web coding module.

This initiative will help in the standardization of ICTs.

E. ICT Sector

The main promoter of ICT and VCs in the UAE is the government. According to the General Manager 3COM Middle East, the reason why the UAE is not very competitive in the telecommunication sector relative to other countries in the Middle East region is that the UAE has been doing a conservative approach to protect current local investors in Etisalat. UAE nationals represent a total of approximately 15% of the total population, therefore Etisalat is perceived as a local investment protection monopoly. It is too early to judge whether *du* is considered to be a true competitor to Etisalat or not. However, it has to be pointed out that 30% of *du* is owned by the government. Foreign telecom companies might be allowed to enter if it proves necessary to the local economy. It all depends about the level of expertise required to run the operation if it can be done locally then we will not see direct presence in this healthy vertical sector by the foreign Telecom. If the foreign expertise is required, it is more likely to see some joint venture[29].

The UAE government has created conducive regulatory environments and institutional mechanisms, and provided the physical infrastructure necessary to increase the likelihood of success within the ICT sector. UAE corporations such as Etisalat and, most recently, *du* are indeed value adding economic citizens of the country. The government is also providing financial and training to SMEs through various mechanisms.

F. Supporting Measures

Many institutional mechanisms are being established to help move the UAE into a knowledge based society; in terms of innovation, the UAE was ranked as the country most likely to become the region's innovation hub, by the Arab Innovation Index (AII) among other variables, this index assesses the level of entrepreneurship, diffusion of incubators, venture capital investments, government initiatives, etc.

VII. ICT APPLICATIONS

A. E-government

The UAE has, in the past 5 years, made important advances in bringing its services online, for both business and individual users. Behind this evolution are two aspects fundamental for the development and success of e-government initiatives in the developing world: the political determination of UAE leaders and the availability of pertinent resources. In this section, we will cover (1) the e-government initiative at the federal level and (2) the e- government initiative in Dubai.

The e-government project of the UAE government was initiated by His Highness Sheikh Hamdan Bin Rashid Al Makhtom, UAE Minister of Finance and Deputy Ruler of Dubai. E-government applications were spearheaded by the Ministry of Finance and Industry since 1997. These services are aimed to reduce

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[29] Mr. Hamed Diab, General Manager 3COM Middle East.

bureaucracy and allow customers to complete their services at a faster rate. The following are some of the services that are currently in place:

(a) *Websites development:* This is the first step toward being a customer focused government. Information and services pertaining to each ministry is posted on the UAE government's website. The general public or businesses can interact and transact their needs over these websites. This website is developed, maintained, and hosted by the Information Systems Department of the Ministry of Finance. The introduction of these websites became the catalyst for the integration of various government services offered by various ministries. By just clicking to a single website (www.uae.gov.ae), the public can navigate through the entire federal government and also understand the various services offered by the different ministries. Important information is always updated. Recently, this website has undergone major improvements in terms of design, look, and content.

Etisalat delivered the most important project of the Federal eGovernment, a unified Portal for the UAE Federal Government (www.government.ae). It is has a content management system CMS, and allows all ministries and government entities to use and update their websites. The Portal provides news, events and information for eGovernment users. Etisalat also provided the websites for all ministries and entities, using the best standards to reflect UAE's culture and identity for each ministry or entity (i.e. http://www.uae.gov.ae/mofi). All these websites were linked to the portal, through a single Content Management System (CMS), were the portal information is updated automatically whenever a ministry or entity site is updated. This has improved UAE ranking from number 60 to 42 in the United Nations Global eGovernment Readiness Report 2005, and the portal has been recognized as regional best practice.

(b) *Electronic mail*(*e-mail*). Electronic mail was introduced to improve communication between employees and also to reduce paperwork in an effort to make a transition to "paperless" offices.

(c) *Financial applications*. Similar to other governments all over the world, the traditional accountability on "control and measure" lies with the Ministry of Finance. Thus, this became one of the important applications introduced to automate financial services provided by the Ministry. The Ministry is currently using a central financial system using NCR UNIX Platform. This system is now undergoing major changes as the Ministry of Finance is introducing the new "Performance Base Budgeting System" where accountability is being decentralized. All financial processes will be re-engineered and "financial personnel" re-trained on how to operate this new system. This is a classic example where "IT" is used as a tool in re-inventing government. All financial processes have been re-engineered and, currently, the appropriate IT applications are being evaluated. The e-Dirham, which became functional and online in 2003, is a payment tool devised by the Ministry of Finance and industry in order to facilitate collection of federal revenues, providing the government with a secure payment method and providing the public with a convenient payment tool. The e-Dirham card which is readily available all over the UAE not only improves the financial transaction but also provides "on-site" transfer of payments between the public and the government agencies. Front service government employees do not have to burden themselves with the security of "physical money" and with this system the government could balance the revenue by the end of the day without looking at the physical books. The e-Dirham has its own secure payment system guaranteed by the government and the payment card can be used for any government services. This project has been very successful and the UAE has had enquiries from many other countries in the region to implement similar systems.

Back in early 2006, and in its continuous effort to implement the strategic e-Government project the UAE Ministry of Finance and Industry (MOFI) launched its electronic portal which aims to increase the efficiency and effectiveness of its services and information provided to its stakeholders. The e-Portal is an integrated window of information about MOFI's projects and services allowing stakeholders to conduct their business with the Ministry with flexibility and efficiency. The portal[30] contains a wide range of information about MOFI's projects and information and its financial services such as the performance based budgeting.

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[30] http://www.mofi.gov.ae

Information and services of total quality management, financial system of the government, e-Dirham, executive training, and federal government services fees, and information about the industrial sector is also included.

On April 3, 2007, a memorandum of understanding was signed between the Ministry of Finance and Industry and the UAE Identity Authority (EIDA) to enable applicants to pay their transaction fees through the e-dirham service at all government departments. The ministry will provide automatic collection machines, payment cards and the necessary electronic links, and it will also train employees to use the system. The service includes using the identity card as an e-wallet to pay for different services offered by ministries, government departments, and private companies that use e-dirham.[31]

Other services that were launched with this portal are electronic housing system and intellectual property rights applications. The portal contains also the latest news of the ministry and has links to relevant international organizations such as the International Monetary Fund, the World Bank, and several other organizations.

(d) *Electronic transaction*. Since the UAE government has gone deep into implementing the e-government project, the Ministry of Finance and Industry started to offer online services to its customers and the public through the new electronic services which are e-procurement and eSinaee, where the customer can register, select the service, apply, fill in the forms, upload the documents and pay online using the e-Dirham card, and finally receive the services. The e-procurement provides a mechanism for government agencies and businesses to transact electronically. The Ministry is in the midst of further reviewing the "supply-chain process" within the government. By re-engineering the supply chain systems, the Ministry will eventually create a total "electronic procurement" where this application will be linked to the government financial and asset management system. The eSinaee is an application specially introduced to manufacturing entities within the UAE. This will allow factory owners not only to have the latest information regarding industrial promotion, but also to apply for tax exemption and other industrial services. The introduction of all the above services has created awareness on the importance of IT for making government administrative services more efficient and effective. More importantly, this has paved the path for the introduction of the overall e-government implementation phase, learning from what has been learned from the initial application implemented. Among those is the importance of having an overall e-government strategy in place. Given the commitment from the highest authority in e-government, a high steering committee has been formed to drive this project. One item was clear among the members of this committee and that is "IT" should be used as a tool to re-invent and reform current "management" of the government. The federal e-government project adds to the convenience, accessibility, and quality of interactions between the federal government, businesses, and the people residing in the UAE. More importantly, e-government will improve information flows and processes within all government ministries.

Criteria for evaluating e-government progress are levels of integration and customization of basic e-services on a single government gateway. Dubai's performance in these areas is notable. The Dubai government has a Web portal, at www.dubai.ae, which allows access to services of various government departments, and is working on integrating these services in order to present them on a single user-friendly or user customizable interface. The portal was launched in October 2001, and has undergone several improvements since. The portal included a comprehensive list of online services available through Dubai government websites, a search facility, and downloadable application forms for government services, an ePay service, as well as eJawaz which allows the users to use all public services without having to register with each relevant government department separately. ePay allows users of government services to pay all charges electronically through a single site. Dubai portal has the infrastructure required for the integration of all government services, but many government departments have not yet made full use of this infrastructure. The Dubai e-government initiative, which was launched in 2000, has accelerated adoption of e-services by

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[31] EIDA events, www.eida.ae (retrieved on April 6th, 2007).

many government bodies to an extent that the UAE ranks 21st worldwide in a United Nations report which evaluated e-government performance of 190 countries in 2003. The initiative—the most advanced of its kind in the Arab world—marked a new phase, characterized by a strong drive toward improving the UAE's ability to provide government services through the Internet. As the initiative has gained momentum, increasing the pace at which government services have been coming online, wider segments of the households, businesses, and government sectors are feeling the benefits. The online availability of government services has made it much easier to access related information and has drastically reduced the time required—by businesses and individuals alike—to carry out transactions with government bodies. The benefit to government comes in terms of increased efficiency, and ultimately reduced expenses on provision of public services. One indicator is the percentage of basic public services available.

In 2006 and in order to further solidify the United Arab Emirates position as an economic hub in the region and the World, and to further develop the business and economic condition within UAE, the Ministry of Economy has awarded Etisalat the implementation of Government e-Services projects that will act as catalysts and enablers in achieving its goals. The initiative is expected to boost efficiency and productivity at the Ministry, and enhance the customer service experience of the businesses and members of the public who interact with it. To support this vision, Etisalat will implement 109 new eServices at the MoE under a single umbrella infrastructure to facilitate rapid creation, deployment and management of online services. Other highlights include the adoption of Etisalat's Managed Services portfolio, which offers streamlined IT and operational management and high level of availability and services. Etisalat is committed to the UAE Federal eGovernment's vision of enabling integrated policy formulation in order to facilitate a knowledge-based world-class government. The solution is developed under principals of good partnership and care for the UAE national interests and concepts of outsourcing and managed services where the Government focuses on conducting its core business and assign parts of its non core ICT requirements to a trusted partner.

B. E-BUSINESS

E-business transactions in the UAE are progressing at a slow rate; a prominent exception, though, is the e-commerce marketplace Tejari.com, launched by Dubai World, and now franchised in Oman, Jordan, Saudi Arabia, Kuwait, Lebanon, and Pakistan. However, while the trading platform recorded more than $ 3 billion as December 31st, 2006 in transactions since its founding in 2000, this represents a small percentage of intra-regional trade.

An example of e-business applications is the initiative of the Dubai Road Transport Authority (RTA). Bus commuters in Dubai can now plan their journey virtually with the click of a mouse, thanks to a new portal launched by the RTA. The bilingual website, www.rta.ae, has a link called "journey planner" which gives information such as what bus to take from location to location in Dubai, frequency of buses and the fares.

C. E-LEARNING

The UAE places special emphasis on e-learning; the many initiatives undertaken by the federal and local governments are an indication of the importance of this area. In June 2005, e-TQM was established with the objective of facilitating quality education through the creation of an effective environment for e-learning through an electronic information network. Back in April 2004, the Dubai government singed an agreement with Microsoft Corporation for establishing an "eSchool" without papers, books, or pens to be the first eSchool in the Middle East and the second one in the world. In addition, a large number of colleges and universities adopt the hybrid model of learning combining in-class with online modes.

A number of e-learning services and initiatives have been setup by public and private entities. For instance Etisalat is currently running "LearnOnline" [32] which is a portal dedicated to lifelong learning by

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[32] www.learnonline.ae

teaching languages online. Some of the language courses available are: English (American/British) Spanish, Italian, French, German and Dutch. On the other hand, Dubai eGovernment has setup their own on-line learning portal[33] dedicated to IT related courses spanning topics such as ICDL, Application Development Client/Server, Communications/Networking, and Wireless technologies to name a few.

The Centre for Excellence for Applied Research and Training (CERT) runs a countrywide continuing education program for all nationalities. The program has been designed for professional development and personal enrichment for people with an eye for continuing education. Initial projects include 100 face-to-face instructor-led courses and approximately 100 on line courses through a Cert website: cert.hct.ac.ae. CERT is the continuing education and applied research arm of a system servicing more than 10,000 students throughout the UAE with more than 40 programs in engineering, technology, and business. The Center operates two Technology Parks in Abu Dhabi and Dubai, fostering a number of joint-venture businesses and training operations through more than 20 strategic alliances with multinational technology providers like Lucent Technologies, Honeywell, and GEC Marconi. These Technology Parks were established to foster the application of the latest technology in the UAE and to help develop the infrastructure necessary to support this technology.

The recent Arab World Competitiveness Report published in April 2007 ranks the UAE at the top of Arab countries with its focus on world-class service in areas including finance, health care and ICT. While the UAE excelled in many categories, the report also focused on potential problems with the biggest issues being education and lack of innovation. The UAE scored poorly on education ranking as low as 112 out of 128 in primary education. E-learning and the infusion and diffusion of ICT in education might help alleviate this problem.

D. E-HEALTH

The UAE has witnessed a rapid development in health car in over the past three decades. The World Health Organization (WHO) ranked Abu Dhabi and Dubai amongst the best healthy 3 cities in the Middle East; the Ministry of Health reports that the 2005 health care services expenditures is estimated at US$ 4.1 billion; the Ministry has allocated AED 300 million (US$ 82 million) to be spent on leveraging cutting-edge information and communications technologies in the health care fields in a bid to automate transactions and healthcare government services in the country. As part of the Ministry's strategy, among others, the following projects have been launched:

- Linking hospitals and other medical centers by an interactive IT system project;
- eRecruitment for physicians and specialists project;
- Preventive Medicine update project;
- Developing IT systems in school health centers project;
- IT medical equipment system project.

The core of the e-health strategy is the new Dubai Biotechnology Park. Dubai Biotechnology and Research Park (DuBiotech[34]), is a free zone (100% tax-free and 100% foreign ownership allowed) dedicated to the biotechnology industry, which was announced in 2005, is scheduled to be completed by the second quarter of 2008. The park which is located on a 2.3 square kilometres is part of an initiative to create an incubator for researchers and scientists, becoming a centre for production, creativity and development in the biotechnology field with applications focusing on agro-food, health care, environment, genetics and stem cell research.

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[33] www.elearn.ae

[34] www.dubiotech.com

Moreover, it will house regional offices of major biotechnology and pharmaceutical companies in addition to manufacturing plants. Dubiotech will be regulated by the Ministry of Health (MoH) and aims at building cooperation with local and international organisations such as World Health Organisation, the Food and Drug Administration (FDA) and the European Medicines Agency.

In 2006, Etisalat continued its strategic partnership roles with many local and federal government entities in rolling our ICT solutions and eService initiatives. A case in point is Etisalat partnership with the General Authority of Health Services in Abu Dhabi to reengineer their operations and install an IP network connecting all five major hospitals and over fifty five clinics in the Emirate of Abu Dhabi.

Part of the country's strategy unveiled by Sheikh Mohammed the week of April 15, 2007, the Ministry of Health (MoH) inaugurated its first one-stop MoH help stop in Dubai; 30 more centers are scheduled to open within a year all over the country; these centers will be connected to hospitals, healthcare centers and medical district offices with fully computerized counters handling pharmacies, purchases, human resources, evaluation of exams of doctors, nurses and labs[35].

Another success was the development and management of Messaging Solution. The solution aims to provide a fully managed secure, reliable and scalable messaging service to all Ministries and other Federal entities, accessible through multiple channels with the following objectives: (1) To have Standard Email Policies implemented across all Federal Ministries/Entities; (2) Centrally enforce Security Standards and Policies for the infrastructure; (3) Avoid duplication of resources and activities at various Ministries to manage messaging infrastructure; (4) Consolidation of investment by individual Ministries for infrastructure; (5) Reduced total cost of ownership; (6) To provide unique identities for employees within Federal Government for official email communication; (7) To grow steadily or exponentially without disruption of service.

E. E-EMPLOYMENT

A number of public and private sector entities offer the option of online recruitment. Some of these place more emphasis on e-employment than others. Dubai eGovernment, for instance, a pioneering initiative in the region to provide online services, promote iRecruitment service, the online recruitment portal supported by Department of Government Information and Resource Planning which provide opportunities for all national graduates and job seekers. Other entities offering this functionality are Dubai Airport Free Zone Authority, Dubai Civil Defense, Dubai Courts, Dubai Police, Dubai Public Prosecution, Entrepreneur's Forum, Financial Audit Department, Department of Naturalization and Residency, Government Information Resources Planning Department in the Ruler's Court, Department of Finance and Etisalat.

This form of recruiting seems to be well accepted by job seekers in the UAE; a poll conducted by *bayt.com* in January 2007 revealed that over 22% of polled applicants found their last job through an internet job site such as bayt.com compared to 11% through a recruitment company and 30% through a newspaper advertisement. With more and more traditional recruitment companies posting the bulk of their jobs on local jobsites such as bayt.com, the number of online jobseekers look is on the rise.

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

A. USE OF ICT IN SUPPORT OF CULTURAL AND LINGUISTIC DIVERSITY

The UAE has made ICT one of its most important priorities as a basis for encouraging cultural diversity and increasing local content. A number of digital Arabic content initiatives have been undertaken. Launched in 2000, as an initiative of the Abu Dhabi Cultural Foundation, Alwaraq.com is the first

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[35] Khaleej Times, April 20, 2007

comprehensive free Arabic Digital library. The website contains in excess of one million pages of the most important Arabic classical books, plus some important books of the world heritage. This digital library evolved over time and now it has a powerful text search engine.

B. LOCAL AND NATIONAL DIGITAL CONTENT DEVELOPMENT

An example of increasing local content is the move by the largest corporations and foundations in the country to launch their web sites in Arabic. The latest of these took place this past month (March 10th, 2007) when Dubai World launched the Arabic version of its website which is designed to provide comprehensive information about the company and access across all its business units in Arabic. Dubai World launched the Arabic version four months after the English version went on-line in November 2006. This was motivated by the belief that a bilingual website that serves both the Arab region and the world at large is pivotal to the company's strategy to ensure continuous communications with all Dubai World stakeholders.

C. ARABIC DOMAIN NAME SYSTEM – ADNS

Arabic Domain name System (ADNS) is essential for the proliferation of Arabic content in the Internet. Being convinced that supporting the Arabic language in domain names requires researching and addressing a number of questions related to Arabic linguistics and the domain name tree structure, the UAE is participating in an important initiative in the region, the IDN (Internationalized Domain Names) initiative, especially those dealing with the testing of Arabic domain names. The United Arab Emirates Network Information Center (UAEnic[36]), the authority that manages domain name registration under the .ae domain, started working with counterparts authorities in the region (namely in Saudi Arabia, Qatar, and Oman) and to develop Arabic domain names allowing Arab Internet users to type in Arabic URL to access local web pages. Additional Arab countries have joined this initiative as well (Tunisia, Egypt, Syria and Jordan) and mor countries are expected to join in the future. The proposed solutions are to be compatible with international standards and rules adopted by the IETF, and in particular the set of IDN standards as defined in RFC 3490, 3491, and 3492.

D. ICT TOOLS AND R&D PROGRAMS

A number of initiatives have been undertaken to promote public/private partnerships especially in research and development; it is still very early to tell if these programs will bear fruit.

IX. MEDIA

A. MEDIA INDEPENDENCE AND PLURALISM

Emirates Media Incorporated (EMI) plays an important role in development of the media in the UAE. As the largest and most diversified media corporation, not only in the UAE but throughout the Arab world, EMI has interests in all branches of media – television, radio, print, publishing and distribution, and the Internet. While the UAE government has given up formal control over EMI, the corporation remains partially dependent on government funding. Nevertheless, EMI enjoys administrative and editorial independence and functions very much as a private company. The Emirates News Agency (WAM) provides news in Arabic and English, together with pictures and news video clips. It has invested in cutting-edge information and communications technology and now makes extensive use of the Internet through a bilingual news website (www.wam.org.ae).

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[36] www.nic.ae

B. The Media and its Role in the Information Society

There are fifteen national newspapers published in the UAE, eight in Arabic and seven in English. In addition, many regional and international newspapers circulate freely in the country. At the latest count, there were 160 magazines and journals (66 in Arabic and 94 in English) published by local and national organizations; and many of the publications produced in the UAE have active websites.

The UAE has numerous indigenous television channels broadcasting in Arabic and English, with many focusing on Arab culture and identity, others on business and sport. Many of the UAE's television broadcasts are available internationally, via satellite. Emirates Cable TV and Multimedia (E-Vision), the only digital cable TV service provider in the UAE, provides over 70 channels, including a variety that offer programming in more than 14 languages and premium packages from ART, Showtime and B4U. There are also many radio stations broadcasting in Arabic and English.

The quality of programming is high and covers a wide range of ICT related topics; many newspapers have a dedicated section dealing with information technology and telecommunications issues. Many radio programs are also available on the Internet. Dubai Media City (DMC) has become an international centre for media-based operations. It is now a successful media community with a highly developed infrastructure that hosts broadcasting companies, TV channels and numerous associated media production companies and freelancers. Major global companies in DMC include CNN, CNBC, MBC, Reuters, Sony, Bertelsmann, BMG, the Associated Press and McGraw Hill. CNN runs its Arabic news website and regional news bureau from DMC.

C. Gender Portrayal in the Media

Fair gender portrayal in the media is essential; as long as media portrays women in traditional, or stereotyped roles, they will be responsible for giving a distorted image and inaccurate picture of people's lives. Media in the UAE had started to give a fair share of coverage to women's issues; the appointment of some prominent women to government and ministerial jobs is also helping in shedding the light on women issues.[37]

X. INTERNATIONAL AND REGIONAL COOPERATION

A. Financing the ICT Networks and Services

The government of the UAE represented by Etisalat, and lately, DU, has done a significant job in financing the ICT Networks and offering ICT services.

B. Infrastructure Development Projects

A number of international and regional initiatives are under way in the UAE; especially the ones signed through the GCC countries. A leading initiative is the GCC cooperation on the biometric smart ID project. Most GCC countries have adopted the chip-based national ID cards allowing their citizens to use them instead of passports while traveling within the GCC zone[38]. In the UAE, the Emirates Identity Authority (EIDA[39]) is in charge of issuing these mandatory, secure, high-tech cards and is planning to introduce them to residents by mid-2007.

International and regional cooperation are also being facilitated by the UAE Telecommunications Regulatory Authority (TRA). The Telecommunication Regulatory Authority (TRA) was set up by the UAE

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[37] There are two women ministers in the UAE, Lubna Al Qasimi, Minister of Economy and Mariam Al Roumi, Minister of Social Affairs.

[38] http://www.arabnews.com/?page=1&section=0&article=95143&d=18&m=4&y=2007
[39] www.emiratesid.ae

government decree No. 3 of 2003. The TRA is a regulatory body that oversees the telecom sector and the licensees in the UAE in accordance with the terms of Legislative Decree no.3 of 2003, and implements the instructions of the Supreme Committee for Telecommunications. The Authority is an independent body and its duties include ensuring telecom services are available to all provinces of the country, assuring that the licensed operators fully follow established rules and regulations, protecting the interests of subscribers, developing telecom sector and helping to implement the best and most advanced technologies.

C. REGIONAL PLAN OF ACTION (RPoA)

It is not clear whether the UAE had a formal RPoA as defined by the United Nations, however, as mentioned above, a national plan of action for building an information/knowledge based society has been formulated in 2006; the number of initiatives leads one to believe that the country is on the right track with respect to transforming the country into a knowledge based society.

XI. MILLENNIUM DEVELOPMENT GOALS

A. PROGRESS TOWARD ACHIEVING THE MDG

As mentioned in the report above, an explicit national plan of action for building the Information Society has been developed and announced in 2006, and as such official/centralized information does not exist; however, the ongoing commitment of the UAE to developing a robust ICT sector is clear. As indicated in the report, many international indicators point to the UAE accomplishments in this regard, in addition to the many initiatives undertaken by the government to boost ICT infusion and diffusion in the country.

It is extremely difficult to measure the country's progress in achieving the Millennium Development Goals; however, all indications lead us to believe that the country is moving in this direction.

B. USE OF ICT FOR ACHIEVING MDGs

As mentioned above, since there is no structured approach to measuring the progress towards achieving the MDGs, it is extremely difficult to identify how ICT can help in reaching these objectives. However, given the fact that the 2005-2006 world rank of the UAE on the Digital Opportunity Index is 37 (second after Bahrain, with a rank of 35, among the Arab countries),[40] and the fact that the UAE continues to lead the region in the Utilization index, the role of ICT in moving toward the MDG targets is not to be underestimated.

C. ICT FIELD PROJECTS AIMING AT ACHIEVING MDGs

Since there is no direct, structured strategy to deal with achieving the MDGs, most of the initiatives and projects mentioned in the report lead directly or indirectly to achieving the MDGs.

XII. WORLD SUMMIT ON THE INFORMATION SOCIETY – WSIS

A. FOLLOW UP AND EVALUATION

While the UAE government is committed to moving the country in the direction of the WSIS recommendations, a formal implementation plan of the WSIS recommendations is not available. There is no formal evaluation plan related to the Geneva Plan of Action, however, among all Arab countries, the UAE ranks second on the ICT-OI 2006 Index, only after Qatar.[41]

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[40] Beyond WSIS: Making a Difference Globally (2006) ; www.itu.org

[41] Beyond WSIS: Making a Difference Globally (2006) ; www.itu.org

B. Initiatives and Projects

No specific projects can be identified at the regional of sub-regional levels which aim at working on specific issues pertaining to the WSIS.

C. Success Stories

A number of websites are available and serve as knowledge sharing portals; the UAE federal government newly constructed website is a good source of information; the Dubai e-government Website is a showcase; the ecommerce success story of Tejari; the Bayt.com website for e-employment; the newly developed website for the Emirates ID Authority (EIDA) is an example in point. As mentioned above, though, more centralized, formal, and structured efforts should take place to track the progress toward the WSIS goals and objectives.

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