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## **PROFILE OF THE INFORMATION SOCIETY IN THE SULTANATE OF OMAN**

**2003**

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## CONTENTS

*Page*

Overview .....	1
Executive Summary.....	3
A. Policies and Strategies .....	
B. ICT Infrastructure .....	
C. ICT Capacity-building .....	
E. Building the ICT sector.....	
F. Applications in Government Establishments .....	
G. Applications in Education.....	
H. Applications in Commerce and Business.....	
I. Applications in Healthcare.....	
J. Digital Arabic Content.....	
<b>I. POLICIES AND STRATEGIES.....</b>	
A. National Information Society Policies and Strategies.....	
<b>II. LEGAL AND REGULATORY FRAMEWORKS.....</b>	
A. Telecom Regulations .....	
B. E-Legislation.....	
<b>III. ICT INFRASTRUCTURE.....</b>	
A. ICT Infrastructure in Oman .....	
B. Personal Computers (PCs).....	
C. Sixth Development Plan for ICT .....	
<b>IV. ICT CAPACITY BUILDING.....</b>	
A. Marketing and Awareness.....	
B. Information Dissemination .....	
C. National Programs .....	
D. Computers in Schools .....	
<b>V. BUILDING THE ICT SECTOR.....</b>	
A. ICT Firms.....	
B. Knowledge Oasis Muscat (KOM).....	
C. Knowledge Mine: A Unique Feature of KOM .....	
<b>VI. APPLICATIONS IN GOVERNMENT ESTABLISHMENTS.....</b>	
A. Computerization of Public Administrations .....	
B. Digitization of Information .....	
C. E-Government Plans .....	
D. E-Procurement Applications.....	

## CONTENTS (continued)

Page

<b>VII.</b>	<b>APPLICATIONS IN EDUCATION</b> .....	
	A. E-learning.....	
	B. Educational Portal.....	
<b>VIII.</b>	<b>APPLICATIONS IN COMMERCE AND BUSINESS</b> .....	
	A. E-Commerce and E-Business Applications (B2B,/B2C, Standards & Security).....	
	B. E-Banking.....	
<b>IX.</b>	<b>APPLICATIONS IN HEALTHCARE</b> .....	
	A. Databases for National Healthcare.....	
	B. Telemedicine and Teleconferencing.....	
<b>X.</b>	<b>DIGITAL ARABIC CONTENT</b> .....	
	A. The Necessity for Arabisation .....	
	B. Current Situation.....	
	C. Complexities of the Arabic Language .....	
	D. Unicode: As a Solution .....	
	E. Action Plan for Future Developments .....	

### LIST OF TABLES

1.	Major Economic and Social Indicators in the Sultanate .....	
2.	No. of Subscribers for Communications Service by Type.....	
3.	Development of Education during the period 2000-2002 .....	
4.	The Expected Information Society Achievement.....	

# OVERVIEW

## A. GENERAL INFORMATION\*

The Sultanate of Oman occupies the South-Eastern corner of the Arabian Peninsula and is located between Latitudes 16 40 and 26 20 North and Longitudes 51-50 and 59-40 East. It has a coastal line extending almost 1700 kms., from the Strait of Hormuz in the North to the borders of the Republic of Yemen, overlooking three seas; the Arabian Gulf, Gulf of Oman and the Arabian Sea.

The Sultanate of Oman borders Kingdom of Saudi Arabia and the United Arab Emirates in the West; the Republic of Yemen in the South; the Strait of Hormuz in the North and the Arabian Sea in the East. The total area of the Sultanate of Oman is 309.5 thousand sq. kms., and it is the Third largest country in the Arabian Peninsula.

The Sultanate is composed of varying topographic areas consisting of plains, wadis and mountains. The most important area is the plain overlooking the Gulf of Oman and the Arabian Sea with an area of about 3% of the total. The mountain ranges occupy about 15% of the total, the most important of which are 'Al Hajr', extending in the form of an arch from Ras Musandam in the North to Ras Al-Had and Al Qara' in the South Western corner of Oman. The remaining area is mainly sand and desert, which includes part of Ar Rub Al-Khali occupying about 82% of the total area.

The climate differs from one area to another; it is hot and humid in the coastal areas in summer, hot and dry in the interior with the exception of higher mountains, which enjoy a moderate climate throughout the year. The climate of the Dhofar Region is also moderate. Generally, the Sultanate has little and irregular rains, though heavy rains fall at times with the exception of Dhofar Region where heavy and regular rains fall between June and October because of monsoons.

## B. SOCIAL & ECONOMIC SITUATION

Oman is proud to present itself as a peaceful country with a congenial environment & a stable economy, thus making it a favorite destination for business investors.

For the last three decades, under the wise leadership of His Majesty Sultan Qaboos bin Said, Oman has made progress in all spheres of economic & social activities and has remarkably raised the standard of living which is a manifestation of good vision, proper planning, fruitful & constructive cooperation between the Government and Citizens.

### 1. *Vision For Oman's Economy: Oman 2020*

To plan future trends of Omani economy a vision conference was convened in June 1995, with the main objective of articulation and identification of policies necessary to realize the Vision for Oman's economy-OMAN 2020 through:

- (a) Sustainable development within a stable Macroeconomic Framework;
- (b) Diversified, Dynamic and Globalized Economy;
- (c) Advanced Human Resources Development;
- (d) Efficient & Competitive Private Sector.

### 2. *Overall Performance Of The National Economy*

The subsequent 5 year development plans have successfully aimed to realize the goals of Oman's vision 2020. The main objective of the vision for Oman's economy: Oman 2020 is to ensure a stable per capita income, and its determined endeavour is to increase it by two fold at real value by the year 2020. In harmony with that, the Sixth Five-Year Plan (2001-2005) has been aimed at maintaining the real per capita

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\* Ref.: Statistical Year Book, August 2002 from Ministry of National Economy.

income at the level prevailing in the year 2000 through targeting the realization of an annual growth in the gross domestic product (GDP) at a rate not less than 3% at constant prices.

Table 1 shows major economic & social indicators points to the steady progress made in the Sultanate.

TABLE 1. MAJOR ECONOMIC & SOCIAL INDICATORS IN THE SULTANATE

<b>Economic Indicators</b>	<b>2002</b>	<b>2001</b>	<b>2000</b>
Gross Domestic Product at Current Prices (Mn. R.O)	7,803.5 (provisional)	7,668.4	7,639.2
GNI per capita (R.O)		2,998	3,061
<b>Social Indicators</b>			
Total Population Estimate (mid year) (No. 000)	2,538	2,478	2,402
Omani (No. 000)	1,870	1,826	1,778
Expatriate (No. 000)	668	652	624
Life Expectancy at Birth	73.80	73.80	73.40
Male	72.20	72.40	72.50
Female	75.40	75.30	74.30
Infant Mortality Rate (per 1000 Livebirth)	16.2	16.2	16.7
Hospitals (No.)	56	56	55
Health Centers (with beds) (No.)	60	58	57
Health Center (without beds) (No.)	58	54	52
Schools	1,187	1,174	1,158
Students	628,971	616,829	602,986
Teachers	33,614	31,423	29,421
No. of Hotels	125	115	100

\* *Source:* Monthly Statistical Bulletin Apr 2003 from Ministry of National Economy.

Updated estimates indicate that the national economy will continue to grow in year 2003 by 1% at current prices, in spite of the potential fall in oil prices and also fall in oil production.

While moving up steadily on the path of progress, Government believes that the growth of I.C.T Sector would have a positive impact to further accelerate the economic growth of the Sultanate. This report explains Oman's Strategic approach and efforts to develop the I.C.T Sector.

## **EXECUTIVE SUMMARY**

### **A. POLICIES AND STRATEGIES**

Since the dawn of the blessed renaissance, Oman has been moving steadily on the path of progress in all spheres of economy.

I.C.T. has been recognized as an enabler of achieving some of the goals of Oman's Vision 2020. Developing I.C.T. sector will help in all round economic development & establishing Oman's Information Society.

In this context a National I.C.T vision was adopted and the National Committee for Information Technology (N.C.I.T) was formed mainly to formulate an appropriate strategy for the development of information technology sector. The Committee had drawn and approved a National I.T. Strategy for the advancement of information and communication technology, introduction of electronic government and shift towards knowledge-based economy.

The main goal of the strategy is to link most parts of the Sultanate by electronic networks. The strategy also provides for the training of human resources and opening up communication channels between government establishments, academic institutions and private companies whose core business is in the domain of information and communication technology. The strategy outlines the policies that should be followed to develop the industry of information and communication technology and encourage its export to other countries.

In pursuance of the National I.T. strategic plans, all sectors of economy are endeavoring to utilize potential benefits of ICT. The Government & public sector are now actively participating in the digital revolution.

### **B. LEGAL AND REGULATORY FRAMEWORKS**

To ensure further developments of the communication sector, the Communication Law was issued in March 2002 with specific policy guidelines. The Government has also set up Telecom Regulatory Authority. This Communication Law has provided a foundation on which further legal frameworks can be erected in regard to transmission & use of electronic data which is referred to as E-Legislation. This is necessary for Oman, which is now embarking on a fundamental shift towards electronic communication & storage of public information (with or without use of such support as internet)

### **C. ICT INFRASTRUCTURE**

Since a sound I.C.T. infrastructure is the backbone of Information Society, the 6<sup>th</sup> development plan (2001-2005) has targeted for substantial growth in number of fixed & mobile phones, Internet services, subscribers to all of which have been steadily growing year to year. At the end of April 2003 the number of subscribers are 235,105 for fixed telephone, 228, 483 for mobile (GSM), 277,759 for prepaid card (Hayyak) and 50,657 for internet. PCs & Internet services are poised to grow dramatically because of increased PC literacy & Government led initiatives.

### **D. ICT CAPACITY-BUILDING**

To achieve support of public & business community, wide ranging awareness campaigns are being organized towards various target groups. There are also plans to establish an Oman Computer Society & an Omani ICT Association to bring professionals nearer to each other and to establish links with similar organizations in other parts of the world.

As regards dissemination of information, the Information & Publication Center in the Ministry of National Economy plays a vital role. Supported by a fully automated library, the Center is the focal point for dissemination of social & economic statistics in the Sultanate.

As a part of National Learning Initiatives, the Government is working on scheme of providing PCs at secondary level of all schools with necessary software & Internet where possible. In addition, vocational training & job – oriented training programs are being introduced with special focus towards Omanisation drive, by schemes such as:

- (a) Vendor certification & accreditation training programs;
- (b) Employer led training programs;
- (c) Entrepreneurship development for self-employment.

There is also a marked increase in I.T. education at university level. A large number of students have been enrolled for higher diploma/bachelor degrees at Sultan Qaboos University (SQU), other universities & I.T. colleges.

Although it had been at a low key so far, increased importance is now being given to R&D. About 100 students have been sent abroad for higher studies in I.T. Recently SQU has received funding from His Majesty Sultan Qaboos bin Said for I.T. oriented research project in Geographical Information Systems (GIS) with remote sensing. Knowledge Oasis Muscat (KOM) is also encouraging innovations by bringing higher education, R&D, business & industry nearer to SQU.

#### E. BUILDING THE ICT SECTOR

Oman is attaching a high priority to build a sound & diverse I.C.T. sector base by encouraging private public participation, inviting global I.C.T. players to set up centers of excellence & developing local entrepreneurs. E-Government & E – Business activities are also boosting such developments. The recently established KOM for fostering all round development has started attracting local & foreign companies.

As per I.T. Strategy, initially focus will be to set up routine call centres, assembly type operations & application development for domestic requirements. Gradually it will move to more sophistication in Hardware and Software developments. There is a large potential for developing software for sectors like Banking, Telecom, E-Government Services, I.T. Enabled Services, Call Centres, E-Business Applications. Eventually it will lead to export – orientation because of tie – ups and presence of global players.

#### F. APPLICATIONS IN GOVERNMENT ESTABLISHMENTS

A large number of public administrations have computerized their operations & are in the process of providing public services thru Internet. As per I.T. strategy adopted by the Government, many E-Government projects in Government & public sector are in the process of launch such as Government Portal, Tendering Site, Suppliers Website, Statistics On – line, Government Forms On - line, One – Stop – Shop / Company Registration.

E-Government is the most prominent component of the National I.T. Strategy which has been launched. E – Government provides a strategic approach & an action plan covering all facets of I.T. spectrum such as E-Government Architect, Applications & Government Services Delivery System, National Telecom & E – Payment Infrastructure, Issues of Digital Divide, Legal Framework & E – Legislation, Security, Audit & Business Continuity, National Learning Initiatives, Omanisation Drive, Development of I.C.T Sector, E- Government Implementation Structures.

#### G. APPLICATIONS IN EDUCATION

E-Learning has yet to make an appreciable dent in Oman. However some positive initiatives have been taken such as establishing Educational Portal.

#### H. APPLICATIONS IN COMMERCE AND BUSINESS

Due to fast spreading use of I.T. & internet Oman’s enterprising companies in public & private sector including many SMEs are now increasingly conducting B 2 B & B2C transactions. Financial community is leading e-commerce revolution.

Many leading banks & some public sector companies are coming in the forefront to promote e-banking & e-payments. As a part of E-Government strategy, e-payment infrastructure and particularly Internet payment gateway is being established for Internet transactions. Central bank of Oman is also considering Electronic Fund Transfer System for once – off and regular payments.

## I. APPLICATIONS IN HEALTHCARE

Oman as a society attaches high value to healthcare. Ministry of Health has taken a strategic decision to use I.T. as the main tool to improve healthcare, re-engineer processes to infiltrate all health care processes. The applications cover healthcare administration, finance and clinical engineering & support services.

The present structure of health – care delivery system in Oman is built in such a way that at the moment it doesn't require traditional telemedicine set – up. However ministry has plans for telemedicine & other related services.

## J. DIGITAL ARABIC CONTENT

Oman's National I.T. Strategy emphasizes the necessity for localization/arabisation of digital contents for the benefit of common citizen. Recent technical developments like "THE UNICODE" will help in such an implementation. Ministry of National Economy is already bringing out its publications on economic & social statistics in both English & Arabic.

# I. POLICIES & STRATEGIES

## A. NATIONAL INFORMATION SOCIETY POLICIES & STRATEGIES

### 1. *Oman's March To Progress*

Since the dawn of the blessed renaissance the Sultanate of Oman, with a total area of 309.5 thousand square kilometres and with 2.538 million population as at 2002, has been having a steady growth in all spheres of social & economic activities. The total GDP at current prices is Omani Rial 7803 million (provisional) as at 2002 (US \$ 20,293 million) comparing to Oman Rial 104 million as at 1970 (US\$270 million). The various development plans and policies of the Government have played vital role to enable it to witness such tangible developments.<sup>1</sup>

The Ministry of National Economy in its Sixth Five Year Development Plan 2001-2005, has given heavy emphasis to the Development of the Economic Diversification Sectors. The interest in diversification of the production sector has been known for a long time, since the Sultanate recognized the importance of depending on renewable resources to accomplish the economic balance and sustainable development instead of depending on a single depletable source which is the oil. The successive development plans pursued this change. This concern was clear in the vision for Oman's economy - Oman 2020 which aims to increase the dependence on the Natural Gas Sector to fill up the decline in Oil sector and completely replace it by the year 2020, in addition to taking care of the industry, trade, tourism, financial services and other production sectors.

The economic diversification strategy forms one of the main fundamental dimensions to achieve the vision for Oman's Economy, together with the other strategies for sustainable development within a stable Macro – economic framework, development of human resource and the private sector.

### 2. *Importance Of ICT*

The communications and its technologies have become the backbone for any development the world over. The development and progress that are evident in the areas of Information and Communication

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<sup>1</sup> *Monthly Statistical Bulletin, Apr 2003/30 Years of Development Process (1971-2000) Ministry of National Economy.*



Technology, (ICT) and the domain they cover, increases the efficiency of national economy in both public and private sectors, provides chances for economic diversification through establishment of industries with intensive information and high added value and helps in accelerating integration into the Global Economy.

In keeping with the global trends the I.C.T sector has assumed a special importance in the Vision 2020 for establishing Oman's Information Society. The Upgrading of this sector is considered as one of the necessary conditions for realizing the objectives of such vision while diversifying the national economy, as indicated in this chapter.

### 3. *Dimensions of Vision*

The main dimensions of the vision for Information Society are as follows:

- (a) Developing a national database through linking together all local information resources and centers. In addition, the same should be linked with the global infrastructure so as to enable the Sultanate to benefit from International Information Sources and increasing the sector's contribution to the National products;
- (b) To strive in utilizing I.C.T in providing services and data to both Public and private sectors. To make these services accessible for all people in the Sultanate in order to transfer the country into the knowledge-based economy and society in such a way that serves the objectives of the sustainable development in the country;
- (c) The private sector shall assume a leading role;
- (d) Telecommunication services to be provided at reasonable rates and make them affordable to all categories of the society.

### 4. *Strategies*

The Strategies adopted in order to achieve such vision may be broadly summarized as follows:

- (a) Formulation of a National Information Technology Strategy;
- (b) Setting the Policies to promote the Information Technology and Telecommunication Industry in the Sultanate;
- (c) Upgrading the Telecommunications in order to match International Standards;
- (d) Restructuring the Institutional and Legal framework of the Sector in order to allow wider private sector participation and provide an environment that is suitable and conducive to free competition.

### 5. *Objectives In The Sixth Five – Year Development Plan in regard to I.C.T*

In the framework of the National I.C.T. Vision, and the understanding of the increasing role of the Sector in raising and promoting the productivity of the national economy and its competitive abilities, the main sector objectives in the Sixth Five – Year Development Plan are represented in the following:

- (a) *Communications area:*
  - (i) Increasing the ratio of fixed phones, mobile phones, internet services substantially from end of 2000 to end of 6<sup>th</sup> plan period in 2005 (more details in chapter 3);
  - (ii) Introduction and broadcasting the use of new technologies and systems;
  - (iii) Improvement of the communications services networks & to make Oman a centre for regional export of communications services.

(b) *Information Technology area:*

- (i) Formulation of national strategy for information technology to cope with the era requirements and working towards its implementation;
- (ii) Connecting most of the Sultanate areas by an electronic information network and to ensure that each person could easily reach quick electronic path aiming for reaching the economic that is based on knowledge by the end of 2005;
- (iii) Creation of electronic commerce environment (E-commerce);
- (iv) Provision of Government services electronically (E-Government);
- (v) Formulation of plans and programmes to improve the human resources in the information technology and communications areas.

6. *Policies And Mechanisms To Achieve The I.C.T Sector Objectives*

In Order To Achieve The I.C.T. Sector Objectives, The Sixth Five-Year Development Plan Has adopted the following policies and mechanisms:

(a) *In the communications area:*

- (i) Adoption of policies that aim to liberalise the communication market and support and promote the free competition and advancement of the frames and procedures organizing the work of the Sector;
- (ii) Executions of the communications sector privatization policy;
- (iii) Regional expansion in provision of communications services;
- (iv) Diversification of the Sector services through introduction of new services of the high value added and paid phone services and paid card services.

(b) *In the information technology area:*

- (i) Creation of communication channels, contacts and formal and informal cooperation between the Government, Academic Research and private companies for creation of a cohesive Information Society;
- (ii) Endeavouring the completion of formation of Government databases of national characteristics such as the public record, workforce, human resources and geographic information in the Sultanate;
- (iii) Formulation of protective security measures for dealing with the networks world;
- (iv) Formulation of policies that lead to provision and encouragement of Information technology and communication industry in Oman and to encourage its export.

7. *Specific Policy Measures Initiated For Realisation of Information Society*

- (a) Aiming for preparation of the Communication Sector for privatization and economic liberalization and provision of the suitable climate for free competition in the supply of sector services, the Royal Decree No. 46/99 issued on 18 July 1999 converted the General

Telecommunication Organization to a government owned Omani closed company (Omantel), as a transitional step towards the involvement of the private sector and expansion of its participation in the privatization of public enterprise. The legal framework for the communication sector was completed and the government is currently evaluating the alternative routes for privatizing Omantel in the future;

- (b) Information Technology has gained special attention. As per the decision of the Council of Ministers, a National Committee for Information Technology (N.C.I.T) was formed with the responsibility of formulating a national policy for Information technology and the strategy for its implementation in a way that would enable the Sultanate to benefit from the huge chances offered by it and avoiding the associated risks. In essence, it aims to ensure effectiveness in the establishment of an Information Society/Digital Society;
- (c) In order to provide the technical reinforcement and help the committee to achieve its tasks, decisions No. 2/99 and 3/99 were issued by the committee to set up I.T. Technical Secretariat for the committee in the Ministry of National Economy;
- (d) To give strategic direction, N.C.I.T. constituted I.T.T.F., Information Technology Task – Force (by inducting senior I.T. directors from various ministries & public – sector) with a view to:
  - (i) Study & adopt best practices & initiate implementation plans and harness & utilise the immense potential provided by I.T. in the economic, social, commercial & scientific arena for the overall welfare of the country.

Under the guidance & direction of the inter – ministerial committee, I.T.T.F. has strived to herald an era of digital revolution in Oman and to establish an Information Society in line with the National I.T. VISION as stated below:

#### *National I.T. Vision*

The leveraging of Information Technology & Communications in providing collaborative services to public & private sectors and citizens through electronic means as being the driving force to move forward the Sultanate to the Knowledge Based Economy and achieve sustainable development.

Working in line with the National I.T. Vision & keeping pace with the global developments, the government has identified the I.T. sector as a driving force in the country's economic diversification programme, away from reliance on oil revenues. At the heart of this policy lies a commitment to develop Information Society, which we call as knowledge-based DIGITAL OMAN.

Today Sultanate of Oman is being nurtured by the proliferation of the latest in information technology (I.T.) applications and products wherein the government has lent vital support. The Government has also announced major projects aimed at creating a digital environment for e – governance and e –commerce, which will offer innumerable opportunities for key players in the I.T. sector, and ultimately enable creating Information Society.

#### *8. I.T. Strategy Framework<sup>2</sup>*

To achieve the objectives outlined above, the Government has chalked out an I.T. strategic framework with the following key strategy elements:

- (a) Connecting Oman Via an Electronic Information Network;
- (b) Achieve the Knowledge Based Economy;
- (c) Creation of an E-Commerce Environment;

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<sup>2</sup> Digital Society Strategy/Government of Oman.

- (d) Providing E-Government services;
- (e) Developing human resources in the Information technology field;
- (f) Creating ICT awareness of the importance of information in the economical cycle;
- (g) Set up National Infrastructure Applications and Databases;
- (h) Set up standards and guidelines for National Networks and Systems;
- (i) Security, Audit and Business Continuity Plan;
- (j) Digital Divide.

## B. SECTORAL PLANS FOR BUILDING THE INFORMATION SOCIETY

With the implementation of I.T. strategy the benefits of Digital revolution will spread far & wide covering entire spectrum of Information Society.

All sectors of economy in Oman are now endeavoring to utilize potential benefits of I.C.T, from oil & gas to health & education, financial/banking/insurance to fast emerging sectors of tourism, new industries/trade – zones etc. Govt./public & private sectors are actively participating in digital revolution, as covered in more details later.

The I.T. Strategic approach adopted by the Government puts heavy emphasis on developing all sectors. Many flagship projects have been identified for immediate implementation (more details in chapter VI-A). Some of these projects cut across different ministries and departments. As per our I.T. Strategy a unique approach called Communities Of Interest (COIs) has been adopted. This approach enables program modules to be shared by different Govt. entities.

## II. LEGAL & REGULATORY FRAMEWORK

### A. TELECOM REGULATIONS

The Communication Law was issued in March 2002 to outline the policies that should be followed to develop the I.C.T sector. Telecommunication Regulatory Authority (TRA) has started regulating the telecom sector. The TRA will issue licenses to new service providers beginning with mobile and internet services in the near future to be followed by licenses for the fixed, data and value added services.

#### **Royal Decree No. 30/2002**

#### Regulation of Communications

#### Policy Issues

As per article (3), the Minister of Transport & Communications shall formulate the general policy of the telecommunications sector and shall present it to the Council of Ministers. The policy shall ensure the following:

- (a) Upgrading the telecommunications sector in order to expand the range of providing telecommunications services and systems to ensure meeting the economic and social development requirements;
- (b) To prepare the requirements for the communications' comprehensive service as per the government's economic and social policies;
- (c) To encourage, in coordination with the concerned authorities, investment in the telecommunications industry;
- (d) Open competition in telecommunications service provision according to the state's general policies;

- (e) Safeguard and develop the Sultanate's interests in the telecommunications field with other countries, as well as the concerned international and regional organizations, unions and specialized committees.

Objectives:

- (a) To ensure provision of telecommunications services all over the Sultanate at reasonable limits and rates. Such services shall in particular include emergency services, public phones, directory information services, operator assistance, marine services and rural areas services;
- (b) To encourage use of telecommunications services so as to access the global markets and information;
- (c) Utilization of telecommunications services in order to encourage tangible and intangible Omani exports, such as accounting, auditing, engineering and consulting services;
- (d) Encouragement of business activities that are related to telecommunications services and systems and accessing their respective markets;
- (e) Providing favorable competitive atmosphere for the licensed so as to ensure provision of world-class services at reasonable cost and fair prices, and taking necessary steps to enable such service providers to compete abroad;
- (f) To encourage conduction of research and development in the telecommunications field.

Responsibilities

- (a) Implementation of the general policy approved for the telecommunications sector according to the programmes prepared by the Authority for such purpose and in accordance with the government policies pertaining to the comprehensive service in harmony with the provisions of this law;
- (b) To prepare the programmes and plans as appropriate for upgrading the general policy of the telecommunications sector;
- (c) To specify the telecommunications systems and services to be performed through telecommunications license or radio permit;
- (d) To issue the permits (approvals) for using the communication systems for which no technical specifications or criteria have been identified;
- (e) To prepare proposed amendments on the telecommunications licenses or radio permits in accordance with the provisions of this law and also take necessary measures to implement them upon their approval;
- (f) To prepare the necessary technical standards and specifications, whether for import and use of telecommunications systems or for connection or interconnection among the licensees' telecommunications equipment and the telecommunications systems, and also adopt appropriate measures to publish such standards upon their approval;

The Communication Law as above has provided a sound foundation on which further legal frameworks can be erected in regard to transmission and use of electronic data which is referred to as E-Legislation.

## B. E- LEGISLATION

The legal framework supporting commercial transactions on the Internet should be governed by consistent principles across state, national, and international borders that lead to predictable results regardless of the jurisdiction in which a particular buyer or receiver of services, or seller or service provider resides.

Accordingly, individual states must take proactive steps to consider the impact of the Internet on their current regulatory structure and amend current laws to better reflect the potential of Internet-based service delivery.

For a country, such as Oman, which is embarking on a fundamental shift towards electronic communication and storage of public information, (with or without the use of such support as the Internet), there is a requirement to establish a fundamental legal framework to cover the transmission and use of electronic data.

According to I.T. strategy E-Legislation will also cover other key areas, such as:

- (a) Authentication Law;
- (b) Open Records Law;
- (c) Procurement Laws;
- (d) Privacy Law;
- (e) E-Payment Law;
- (f) Liability Law;
- (g) Jurisdiction.

### **III. ICT INFRASTRUCTURE**

#### **A. ICT INFRASTRUCTURE IN OMAN**

Oman at the moment has a single telecommunication service provider, which is Oman Telecommunication Company (Omantel). Omantel is the sole service provider for voice, data and Internet services in Oman for both fixed and mobile services.

The main telecommunication services available in Oman are the following:

- (a) Fully digital network including digital switches and inter-exchange fiber optics transmission links;
- (b) Digital data network for the connection of the business and financial centers throughout the country;
- (c) GSM mobile services with roaming to over 100 operators in 53 countries;
- (d) Mobile fax and data service through the GSM network;
- (e) SMS service for the mobile subscribers;
- (f) Value added services for the fixed and mobile subscribers such as calling line display, call waiting facility, call conference, prepaid calling cards, payphone, paging, voicemail, etc.;
- (g) Internet dial-up and leased line services;
- (h) Availability of advanced services including ISDN, ATM, WLL and VSAT.

#### *Fixed line telephone service*

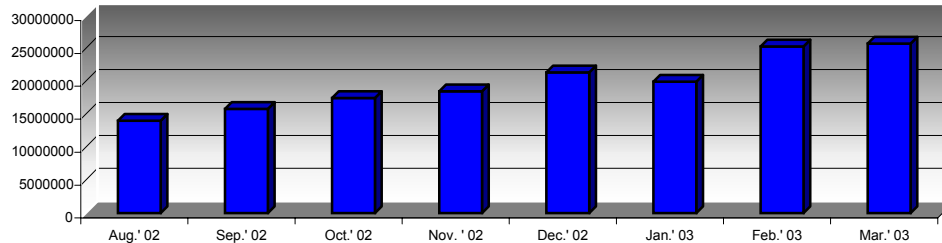
Within Oman, Omantel has a fixed line capacity of 235,105\* telephone lines as of April 2003 fully digital.

#### *Mobile telephone service*

The Oman mobile service is based on the GSM standard, which was introduced in 1996 .The GSM service is fully digital with full roaming facility and has proved to be very popular. We have 228,483 subscribers at the end of April 2003.

In 2001 the prepaid service was introduced, this service was very popular, and has grown very fast. We have 277,759<sup>3</sup> subscribers at the end of April 2003.

In November 2001, Omantel has introduced the SMS service, which provides data short messages of up to 160 characters, this service has experienced so much popularity that the SMS has undergone two upgrades. The following figure shows how popular this service is:



Source: OMANTEL

#### Internet service

Oman Internet introduced Internet service in January 1997. By the end of the first year of service there were 4,163 subscribers. Omantel has experienced an average of 50% growth rate with the subscriber base of 50,000+ by the end of April 2003. Currently, there are over 100 corporate leased line customers and 150+ Cyber cafes. Omantel is a full service ISP providing Web surfing, email, domain name registration service, web-hosting, ISDN, Internet roaming, pre-paid Internet and soon to offer ADSL service. Omantel is destined to provide value added services for both mobile and fixed line on its IP network and infrastructure with the introduction of GPRS and 3G networks.

The available Internet backbone capacity is over 310 Mbps, which includes 2 STM1 via Sea-me-we3 and FLAG.

In addition to current services, the Internet business unit is currently capable of providing almost all ISP/ASP related services such as IP telephony, e-business/e-government/e-commerce (soon to be launched), Multimedia, Videoconferencing.

The current revenue model is designed such that over 80% income is derived from dial-up subscribers. This will, however, change to other value added services such as messaging, e-commerce, Web Hosting, Data Center, Virtual Private Networks (VPN) banner advertisement, bandwidth reselling and others. As the applications are developed and accepted by the business community, the revenue model would also change proportionately. For instance, the banking, government, education and private sector will be the target market as opposed to current scenario of overwhelmingly individual accounts. Table 2 indicates the number of subscribers for Communication Services.

#### Future plans of OMANTEL

In order to service the need of a de-regulated market and the digital society of Oman planned by the government, Omantel has the following plans for the telecommunication network:

<sup>3</sup> As per table given ahead.

- (a) Expanding the Fixed, GSM and Internet network throughout the country;
- (b) Launching of the GPRS and MMS services;
- (c) Launching of a broadband access network based on XDSL throughout the country;
- (d) Expansion of the core transmission network with DWDM technology.

TABLE 2. NO. OF SUBSCRIBERS FOR COMMUNICATION SERVICES BY TYPE\*

	<b>End April 2003</b>	<b>2002</b>
Fixed Telephone	235,105	233,897
Mobile (GSM)	228,483	220,401
Prepaid Card (Hayyak)	277,759	243,450
Internet	50,657	48,232
Cellular Phones	-	1,036
Pay-Phones	6,341	6,338
Paging	18,731	22,161
Telex	244	244

*Source: OMANTEL*

#### B. PERSONAL COMPUTERS (PCS)

PCs have now permeated all sectors of economy. PC penetration is almost certain to increase at a dramatic pace, fuelled by factors like rising PC literacy and government-led IT initiatives. The momentum is also set to pick up tremendously in the next few years as PCs become more affordable. During the census to be conducted in Dec 2003 we will have the latest picture of PCs and Internet being used at Cafes & at homes.

#### C. SIXTH DEVELOPMENT PLAN FOR I.C.T.<sup>4</sup>

Since a sound ICT infrastructure is the backbone of Information Society it has assumed special significance in the 6<sup>th</sup> development plan (2001–2005). Some of the planned indicators as per this development plan are:

1. Increasing the ratio of fixed phones from 9.4% by the end of 2000 to about 13.0% at the end of the Plan period 2005. This is by increasing the number of subscribers in the fixed phones services from about 225.4 thousands at the end of 2000 to about 344.4 thousands by the end of the Plan period 2005
2. Increasing the ratio of the mobile phone to about 10.7% in 2005 compared to 6.8% in 2000, by increasing the number of subscribers to 284.5 thousands by the end of the Plan period 2005 compared to 162.2 thousands at the end of 2000
3. Increasing the ratio of the Internet services substantially from 1% by the end of 2000 to about 5.2% at the end of the Plan period 2005. This is through increasing the number of subscribers in Internet services from about 23.9 thousands at the end of 2000 to about 138.8 thousands by the end of the Plan period 2005.
4. Improvement and modernization of the capabilities of the services of the mobile phone and introduction of the mobile Internet system through the third generation of mobile phone (G3).
5. Creation of enlightened environment about the importance of information technology and communications in the economic sphere, and in supporting decision-making, simplification and facilitation of procedures and in the area of knowledge transfer.

<sup>4</sup> Sixth Five Year Development Plan (2001-2005).



## IV. ICT CAPACITY BUILDING

### A. MARKETING AND AWARENESS

Achieving optimum success calls for the support of the public and the business community. This will only be achieved when they fully understand the potential benefits.

In this regard many steps are being taken in accordance with the I.T. strategy such as:

- (a) Awareness campaigns, with specific campaigns geared towards target groups;
- (b) Publicity and Internet access points in libraries, post offices and other public buildings;
- (c) Public announcements of benefits of I.T. initiatives being introduced;
- (d) Integrated publicity campaign for 'Quick Wins', which emphasize that the Information/Digital Society project is off to a flying start;
- (e) The Knowledge Oasis Muscat (KOM) to launch campaign to capitalize on the Information / Digital Society strategy;
- (f) Trade associations such as Oman Chamber of Commerce & Industry to publicize with members and others;
- (g) Seminars, conferences, special interest group presentations, Information/ Digital Society 'Road shows';
- (h) Establish an Omani Computer Society responsible for establishing tighter links between ICT business community and educational, R & D Organizations and Government entities;
- (i) Establish an Omani ICT trade association that represents workers in the ICT sector and is also concerned with establishing relationships between Omani businesses and foreign businesses and organizations.

### B. INFORMATION DISSEMINATION

Ministry of National Economy plays a vital role in dissemination of important information as indicated below:

The Information and Publication Center in the Ministry of National Economy plays a vital role in creating a National Data Bank. It is also the main focal center for the dissemination of Economic and Social Statistics in the Sultanate. It acts as a hub between the data collection and analysis phases and other phases relating to data processing, maintenance, publication and dissemination.

One of the major tasks of the center is to establish and develop two main databases, the Social Economic Database (SED) which contains statistical data from 1970 in all major social & economic sectors. The other database is the National Geographic Data Base (NGDB) for all geographic levels (regions, wilayats, towns & villages) of geo-based data in digital and analogue forms.

The other major task of the center is to designing, developing, and programming of systems for census, household survey, consumer price index, and other major surveys. The Information Systems Department sets documentation standards and methodologies and training of users & technical staff.

All the above tasks are supported by the Computer and Technical Support department, which is responsible of providing and installing of the Software & Hardware to the users in the Ministry and maintains a network and internet facilities.

The main objective of establishing these systems and databases is to ensure timely and efficient flow of information to its various users for the purpose of Plan and Project formulation, monitoring and evaluation, and for general research and public awareness.

The information is being provided to the public in the following forms:

- (a) Publishing Statistical books about the social & economic indicators;
- (b) Computer print outs as hard copies, as well as soft copies on FDs/CDs;
- (c) Internet/information on site;
- (d) Monthly bulletins.

### C. NATIONAL PROGRAMS

Computer education is now being introduced in almost all the prominent schools & Government Colleges. Besides these, many private Colleges & Training Institutes have started imparting I.T. training at different levels & skills. Recognizing the necessity to have abundance of I.T. skills, as part of national programs, massive National Learning Initiatives have been/are being launched as covered in this chapter.

### D. COMPUTERS IN SCHOOLS

I.T. exposure for students at school level is being taken up seriously with many schools introducing computer training as a part of the curriculum. One important task is the Training of the Trainers, Teachers, Academic & Administrative staff so that they are able to take active part in the program.

Government is presently working on the scheme of providing PCs at all the secondary level of schools along with necessary software and Internet facilities wherever possible

Today young children are fairly keen and inclined towards computers – be it for games, education or general knowledge. Table 3 indicates the present number of schools, teachers and students.

TABLE 3. DEVELOPMENT OF EDUCATION DURING THE PERIOD 2000-2002\*

	2002	2001	2000
Schools	1,187	1,174	1,158
Students	628,971	616,829	602,986
Teachers	33,614	31,423	29,421

*Source: Monthly Statistical Bulletin Apr 2003, Ministry of National Economy.*

### E. VOCATIONAL TRAINING/JOB – ORIENTED – TRAINING

#### 1. Omanisation Drive

One of the high priority objectives of all developments in the Sultanate is an effort towards “Omanisation Drive”.

All skill developments are being directed so that the youth is not only able to get I.T. jobs but also contribute to the national development of which I.T. is now a major driving force.

To achieve this objective Vocational Training and Job – Oriented – Training Programs are considered very important part of National Learning Initiatives.

The following initiatives are being covered in this chapter:

- (a) Vendor – sponsored training programs;
- (b) Private corporate – sector initiated training programs;
- (c) Entrepreneurship development programs

Computers are practical tools. Whereas academic and theoretical exposures leading to University degrees/diplomas are important, industry and business look for job oriented training at various levels. Thus vocational training assumes great significance

Oman is venturing into varied training programs in this direction as covered below:

## *2. Vendor – Sponsored Training Programs*

### *(a) Accreditation Schemes*

Apart from good curriculum it is now considered essential to have “standard & popular Industry Accreditation & Certifications” by leading global I.T. players such as IBM, Oracle, Cisco, Microsoft to significantly improve students “employability”

Such reputed vendors & organizations are generally only too willing to associate in setting up such facilities as required for conducting their testing and certifying schemes. Since these represent the latest trends and platforms on which candidates will have to work in actual jobs, such accreditations are highly desirable.

Oman Govt. has already concluded Enterprise S/W License Agreements with Microsoft and Oracle involving training of Govt. employees.

Private sector in particular have more confidence in employing such students who have both the University Certificates/Diploma/Higher Diploma/Degree and a standard Accreditation certificate of reputed global player. This will also be particularly helpful in getting into companies with export – assignments or even for taking up foreign jobs.

For example Oracle and Microsoft offices are already perusing Academic Coordination with Sultan Qaboos University to help in gainful employment of Omani youth on passing out of the University. Other vendors are also doing the same.

Some other examples of above certifications being considered seriously at various levels of courses being offered at colleges are

### *(b) Foundation/Certificate level in I.T.*

To include the International Computer Driving License (ICDL) as a tool in the curricula of I.T. certificate as it is becoming almost an industry standard and is widely recognized and will end up in students getting an internationally recognized certificate that will boost their chances in getting jobs especially with international firms expected to come & operate in Oman in the I.T. field.

### *(c) Diploma level in I.T.*

In order to effectively “Introduce the fundamentals of applications programs”, using the Microsoft Office suite is a typical example. Hence Microsoft Accreditation will help.

### *(d) Higher Diploma/Degree Levels:*

- i. Oracle is one of the de facto standards of the industry in the area of Relational Database being widely used in Oman for which tie – up with Oracle Academic Initiative Program (OAI) is being

taken up as a unique partnership between Oracle and the academic program. This will help accredited non – profit colleges and universities integrate world-class information technology courseware quickly and productively into today’s workforce. With OAI, institutions gain access to world class software and support, cutting edge information technology curriculum, faculty education and Oracle certification resources

- ii. Tie- up with Microsoft & Cisco to include the curricula of the Microsoft Certified System Engineer (MCSE) as well as CISCO NETWORKING ACADEMY prepare tomorrow’s I.T. workforce, helps bridge the digital divide, and allows one to experience true e – learning technology
- iii. Accounting, HRM, Enterprise Resource Planning (ERP), Supply Chain Management (SCM) are also major applications in Oman requiring special exposure.

Recently Ministry of Manpower thru its Vocational Training Wing conducted a 4 day workshop at the Higher College of Technology to dwell on various aspects: the expected outcome of various programs being offered by I.T. Colleges, course contents, methodology, curriculum, on job training, industry projects, Enhancement Training etc with active participation of private industry, technical colleges & ministries so as to come up with real – life requirements.

The recommendations arising out of the deliberations (such as those indicated above) will provide practical orientation to the Academic Training Programs.

### *3. Private Corporate – Sector Initiated Training Programs*

The Government constituted a committee to look into various aspects of providing requisite training to the youth to enable them to take up jobs especially with private sector. After consulting private sector, on the skills they require and keeping all the issues of immediate concern in mind, the committee has devised a mechanism based on an “employer-driven model with govt. funding” for imparting skills & employment to potential job- seekers.

Salient-features of this mechanism are:

- (a) Private Sector will identify potential candidates for employment (through advertisements or through the recruitment cells set-up in the GOVT.);
- (b) Screen the candidates for assessing aptitude & level of IT knowledge;
- (c) Work out training required to be imparted to these candidates to cater to the business requirements (indicating also job-descriptions & the levels of positions etc.).

By providing comprehensive details of the skills necessary for various types of I.T. functions the proposed training plans are then worked out. Such training plans must indicate:

- (i) Types of Training to be imparted;
- (ii) Durations of trainings to be imparted;
- (iii) Costs involved.

Further indicating if any component of training is required to be conducted outside the country, as also whether any certifications/accreditations as already mentioned in this chapter will be needed.

#### *(a) Commitments & responsibilities*

Such business oriented recruitment & training programs will be administered & implemented by the Pvt. Sector companies, being the employers also. Since it is for a national cause, the private sector companies concerned have to honor certain commitments, such as:

- (i) It is mandatory to run such programs;
- (ii) Being a mission on non-profit basis, only the costs of imparting Trainings to be recovered before productive employment of candidates;
- (iii) To ensure that adequate training must be given to make candidates employable;
- (iv) Moreover, such training is to be given to only bonafide & interested candidates;
- (v) After training the Private sector must genuinely employ such trained youths for a min. period as per terms of the scheme.

#### *4. Entrepreneurship Development Programs*

I.T. is predominantly a service sector where many services can be provided by small outfits managed by individuals with/without the help of a few supporting staff. This is extremely useful in gainful self-employments and can be achieved with small investments & short training programs in entrepreneurship & business skills.

With E-Govt. set to enhance its reach to larger population, there is a need to establish a number of services centers, which can be owned & operated by the smaller entrepreneurs with the support of SANAD Programs.

Ministry of Manpower is considering extending initial start – up support including extending financial support towards part of initial investment as well as imparting skills to young technopreneurs.

The training programs of about 6 months duration will cover the following:

- (a) Foundation levels skills;
- (b) Technical skills;
- (c) Business skill;
- (d) Entrepreneurial skills;
- (e) Basic management skills;
- (f) Soft skills.

#### F. UNIVERSITY EDUCATION

Sultan Qaboos University (SQU) is the leading university comparable to international standard universities.

Apart from SQU, bachelor degree courses in I.T. are also offered by Sohar University, Majan College, Caledonian College of Engineering, National College of Sciences and Technology, Higher College of Technology and Sur University College. Most of these institutes have academic tie – ups with leading foreign universities. In addition a number of private higher education institutes have launched I.T. courses to meet the growing demand for seats. This year, a large number of students have enrolled for Bachelor Degree and Higher National Diploma courses in I.T.

Knowledge Oasis Muscat (KOM) is also expected to contribute towards building a Knowledge Economy culture in Oman. KOM is coming on – stream as the knowledge Economy gathers momentum. Education and training are crucial ingredients in developing a Knowledge Economy culture, and KOM already houses two leading private I.T. colleges. The first to open its doors was the Middle East College of Information Technology (MECIT), an affiliate of India’s Manipal Academy of Higher Education, where many students have already enrolled. The Waljat College for the Birla Institute of Technology, Ranchi has also been opened.

#### G. RESEARCH DEVELOPMENT & INNOVATIONS IN I.C.T

##### *1. The Emergence Of The Knowledge Era*

The world has witnessed during the Twentieth Century unprecedented advances in the fields of science, technology, communication and information technology that contributed to exceptional

developments in physical and applied science, paving the way for more inventions and innovations in all aspects of life.

In the light of the rapid advances in science and technology, knowledge has become a crucial factor of production, and production of knowledge has become a crucial activity in all societies. This relationship is even more important in high value added productive activities that are based on knowledge density and experience accumulation for the betterment of performance and productive adequacy.

The emergence of the knowledge era led to a shift in economics paradigm of developed countries to knowledge Based Economy. This has created a big gap in technologies and skills between developed and developing economies.

The Sultanate has since the dawn of its blessed renaissance, realized the importance of research and development in driving economic, social development and improving quality of life. Oman Economic Vision 2020 attached significant weight to the research and development sector as a pillar of sustainable economic development. Research and development sector represents a pivotal component of economic diversification strategies of the economic Vision. The high value added, the export oriented diversification and technology transfer and naturalization strategies all depend on this sector. The Economic Vision, therefore, focuses on concentrating efforts to advance research and development sector and support it by increasing its appropriations.

## *2. R&D In The Sixth Five-Year Plan*

The Sixth Five-Year Plan accords great attention to research and development in full cognizance of its importance in making the economic diversification strategy a success and in making the sustainability of economic development possible. The plan aims at promoting the research and development through the building of national skills in relevant areas. The plan also attempts to evolve a flexible and effective regulatory regime to organize the sector, fund its activities from public and private sources and promote coordination and cooperation with regional and international centers of research and development.

During 2001, huge strides were taken to build up a skilled national cadre in the area of research and development. In this respect, the technical team of information technology is undertaking the responsibility of training nationals in the field of information technology through various programmes in coordination with the Ministry of Higher Education and foreign institutions. Within this context, some 50 students from the secondary school graduate were sent abroad in 2002 to study information technology in countries advanced in this discipline such as Malaysia, Singapore and Australia. Another group of 47 trainees, mostly from the graduates of industrial technical colleges, were also sent on scholarship to India for the same purpose. Furthermore, some of the big technology companies are also devising a proposal for the training of Omani citizens in the sphere of information technology. Sultan Qaboos University is also contributing to the advancement of research and development.

It has recently introduced new programmes such as architecture, water engineering and in addition to the existing Masters programmes in various disciplines. It intends to introduce Ph.D. programmes.

## H. INCREASING IMPORTANCE OF RESEARCH

### *1. SQU gets funding for 5 research projects*

With regard to funding of research and development activities, allocations for this sector has increased, considering that R.O.1.75 million (US \$ 4.5 million) has been allotted to research activities in Sultan Qaboos University, which includes a benevolent donation from His Majesty Sultan Qaboos bin Said. This is in addition to the traditional sources of funding these activities such as the funds given regularly by PDO for scientific research.

Amongst five research projects in strategic areas, ranging from finding solutions to diabetes to reusing grey water for sustainable water management, which have been recently granted funding from His Majesty's research fund, one prestigious project is the I.T. oriented GIS, as described below:

The use of geographical information systems and remote sensing to monitor and analyse urban growth in greater Muscat: This urban growth has led to several issues in urban planning and environment and requires precise detection to be managed, predicted and planned. The project aims to employ I.T. oriented geographical information systems (GIS) and remote sensing (RS) technology which is gradually becoming one integrated technology and is widely used to manage analyse and predict the urban growth by modelling past, present and future urban growth.

#### H. KOM: AS A HUB FOR INNOVATIONS & TECHNOLOGY TRANSFER

*\* Higher education, R&D and innovations all together at KOM*

KOM will accommodate every size of business, from a single entrepreneur to major international research facilities, call centers and business headquarters. Indeed, KOM is totally committed to creating an environment in which entrepreneur, researchers, and small – and medium – sized enterprises (SMEs) as well as Academics are established at one place.

KOM's mission is to be a hub of Information and Communication Technology (ICT) excellence, one that advances human and social development through the generation, dissemination and application of knowledge using Oman's competitive advantages, by carrying out a series of initiatives that include: attracting not only blue chip companies, but knowledge and technology – driven SMEs by offering premises on flexible terms which cater to the high risk and uncertainties of small embryonic companies; providing world – class facilities and support services for businesses that are developing or trading in *innovative products and services*; establishing an incubator programme where start – up businesses can be nurtured by innovative measures (as described later) and stimulating an increased rate of interaction between Oman – based ICT academic institutions, SQU and knowledge and technology – driven businesses, R&D Organisations.

KOM's remit is very clear: enhance and nurture Oman's position as a regional centre of business excellence, innovation and entrepreneurship: something that's important to encourage youngsters to pursue careers that require a background in math, science, engineering and technology.

#### I. A SPECIAL MENTION ABOUT R&D AND INNOVATIONS FOR SMES

##### 1. *The Park's incubator programme (The Knowledge Mine)*

The Knowledge Mine supports and encourages the creation of knowledge and technology-dependent start-ups by providing an affordable working environment that makes it possible for companies and entrepreneurs to devote more of their capital to R & D, testing and the production of future goods and services. Moreover, with access to a multi-disciplined Business Mentor Programme, the Knowledge Mine provides start-up residents with experienced advice and support. Facilities such as meeting and conference rooms, photocopier, audio-visual equipment and reception will also be available to residents. In providing such facilities, support, networks, resources and training, the Knowledge Mine will help businesses and entrepreneurs turn their innovative ideas into market-leading companies.

## V. BUILDING THE ICT SECTOR

### A. ICT FIRMS

To achieve Omanisation program effectively thru National Learning Initiatives, it is essential to develop a sound ICT Sector, covering software development, hardware base both for I.T. and communications, along with complete range of supporting activities of services, marketing, training, supplies etc. Apart from generating employment, it would help in all round sectoral developments since ICT is now one of the main development tools for a sound economy. As more & more local base is built up, an Information Society will gradually emerge.

It is for this reason that Oman Govt. is attaching a high priority to build a sound and diverse ICT Sector. The various initiatives being taken are:

- (a) Encouraging private public participation (PPP) for collaborative arrangements;
- (b) Inviting global ICT players to set up “Centres of Excellence”;
- (c) E Govt. activities;
- (d) Local entrepreneurship & self employment schemes;
- (e) Facilitate e – business & e – commerce activities;
- (f) Cluster development.

Recently formed KOM is a good move to foster all round development in ICT. Many necessary supporting structures have been put in place. It has started attracting global ICT players & also local ICT enterprises. This will have cascading effect, as similar industries will tend to come in clusters.

According to the I.T. strategy, the development of I.C.T. sector is envisaged to cover all round activities. The areas to be focused on initially are:

- (a) Production and assembly of basic PC’s;
- (b) Establishing customer contact and service centres for the Arab countries;
- (c) Data entry and conversion;
- (d) Application development;
- (e) Arabization of products;
- (f) Developing indigenous software enterprises by venture funding.

The focus will be later shifted to:

- (a) Design and production of more advanced computers and sub – assemblies/contract eng’g. In selected areas;
- (b) Software product development, marketing & services for local needs

As we gain experience & confidence in ICT Sector, Oman will endeavor in exports earning ventures by:

- (a) Partnership arrangements with existing ICT global players e.g.;
- (b) Design and development of Omani packages that are marketed abroad;
- (c) Spin – off from international providers in Oman;
- (d) Commercialization of SQU based R&D for Omani products for exports;
- (e) International call centers, I.T. Enabled Services, Back office transaction processing for MNCs;
- (e) Promoting exports by companies set up at KOM.

#### B. KNOWLEDGE OASIS MUSCAT (KOM)

KOM is a public – private sector – led initiative situated on a 68 – hectare eco – friendly site of natural beauty located 32 km north west of Muscat, and on the doorstep of Rusayl Industrial Estate and Sultan Qaboos University (SQU). More than 12,000 sq. mt. of office and incubator space and two leading private I.T. colleges have already been completed, and a further phase of development is at present underway.

Oman has launched an audacious bid to become the regional technology hub. Since knowledge – based investment holds the key to Oman’s economic and social development, knowledge Oasis I.T. Park in Muscat will act as the catalyst for this bold project.

Spearheaded by the Ministry for Commerce and Industry KOM has worked with global consultants to draw up a wide – ranging strategy to transform Omani economy: technology universities, technology parks and business incubators all at one place.



“A fundamental shift is required from Raw material processing and manufacturing to a knowledge – based economy.” KOM forms the cornerstone of this ambitious policy. The park has been designed to meet the perceived needs of leading technology players with industry standard infrastructure.

“There is a substantial potential in Oman for developing software for sectors such as banking, telecommunications, government’s programme of e-governance, I.T. – enabled services and call centers, providing a source of qualified I.T. professionals for entire Gulf,”

KOM is joining a domestic e – movement that’s already beginning to pick – up speed. KOM, which functions under the aegis of the Public Establishment for Industrial Estates (PEIE), is the first of its kind in Oman, which will effectively employ a large number of youth specialized in I.T.

With the race on to attract international investors, many initiatives have already started coming, For example:

- (a) One MNC has agreed to set up a state-of-the-art laboratory for testing software by establishing a software test bed facility at KOM. Currently, software developers in Oman send programs abroad to test them;
- (b) There are other initiatives at play, for example.

KOM has signed lease agreements with one local company for call center and another with an Indian software/Information Services Company.

### C. KNOWLEDGE MINE: A UNIQUE FEATURE OF KOM

The Knowledge Mine, is the Sultanate’s first major business incubator initiative, a project that will help shape the park’s distinctive identity. “The Knowledge Mine is open to those, wishing to establish an ICT related business. Alternatively, a business may be in the early stages of adding, but needs technical or commercial support to drive it forward.” Whatever the position, the knowledge mine helps determined people build and develop sustainable businesses.

While maintaining focus on key business issues, the mechanism provides, support by an expanding network of technical and professional organizations and individuals allowing incubates to draw upon an additional pool of expertise.

Knowledge Mine will thus play a key role in encouraging the tiny and SME Sector. The need to provide a base of operation for embryonic businesses is recognized by KOM management. Supported by organizations such as the Youth Fund, Oman Development Bank and Sanad, the Knowledge Mine provides complete with state-of-the art office facilities and broadband Internet access. “ Start – up and early stage business need to quickly establish credibility. That’s what association with KOM can provide”.

## VI. APPLICATIONS IN GOVERNMENT ESTABLISHMENTS

### A. COMPUTERIZATION OF PUBLIC ADMINISTRATIONS

The public sector institutions in advanced and developing countries started adopting the concepts of electronic systems in performing their daily activities and in providing better services for citizens. This concept of computerization of public administrations was further enhanced when these institutions started providing these services through the Internet to the individuals, government departments and the private sector.

The information technology has great influence over the way people work, learn, go for recreation / shopping or communicate. This requires rectified interaction between citizens and local Government departments.

As the public sector departments seek capacity enhancement to fulfill their duties and interact with the global economy which is linked through the internet, utilization of the information technology has proved essential at all walks of life and thus many countries decided upon adopting the idea of “E-Government” aiming to fulfill duties or provide services to citizens, more promptly and efficiently.

OMAN has adopted E – GOVT. as the most prominent venture amongst various I.T. initiatives. As per I.T. Strategy approved by the Government, many E – Government projects in government & public sector are in the process of launch. Flagship/Quick–Wins as mentioned below are examples of such moves, which are being started to create an immediate impact.

### 1. *Flagship Project/Quick Wins*

- (a) Government portal;
- (b) Government tendering site;
- (c) Government suppliers web site;
- (d) Statistics online;
- (e) Government forms online (e-forms);
- (f) One – stop – shop/company – registration.

A brief description of some these projects has been given underneath.

#### (a) Government portal (uberportal)

*Features:*

- (i) First presence of the Government UberPortal;
- (ii) Availability of up-to-date cross-Government Information in a single electronic location;
- (iii) Information available on-line or as downloadable PDF files; (iv) Ultimately evolve into full Government UberPortal.

#### (b) *Government tendering site*

More details in chapter VI (D).

#### (c) *Government supplier site*

*Features:*

- (i) Suppliers can access payments and order details relating to particular invoices;
- (ii) Suppliers can determine the status of their Invoices (paid/unpaid);
- (iii) For paid invoices, suppliers can access date of payment, bank account for payment;
- (iv) Statement of what payments have gone to which bank accounts for a specified period of time.

#### (d) *Statistics online*

*Features:*

- (i) To facilitate easier availability and accessibility of data of interest to general public in different types & means such as on CDs, Internet and computer print outs;
- (ii) Up-to-Date Development of National Economy Statistics available to the citizen or business user;
- (iii) Customisable to allow user to select particular information sets (based on defined criteria – year, region, etc.);
- (iv) Citizen or business user accesses published statistics in pre-defined format (available locally as static web pages);
- (v) Citizen or business user requests selected data based on specified selection criteria (accessed in real-time from statistics repository).

(e) *Government e-forms*

*Features:*

- (i) Availability of all Government Application Forms in a single electronic location;
- (ii) Government entities can post new forms or update existing forms on-line;
- (iii) on-line data entry facility to part-fill forms with download/print option;
- (iv) potential e-mail link to submit electronically;
- (v) short-Term: provides printable forms from an electronic location;
- (vi) links to information Portal for Information on how to complete and submit forms and on how to acquire services;
- (vii) Medium-Term: Will allow electronic submission from the web site for all Government services;
- (viii) Long-term: Support on-line payment through shared payment gateway.

(f) *One – stop – shop/registration*

There has been a long-standing ambition to support on-line company registration and the Government through the Ministry of Commerce and Industry has taken the initiative to consolidate the service provision within one building through the One Stop Shop. This has improved the services rendered to new businesses being registered or existing businesses requesting changes in their registration by minimizing the number of visits needed to complete the registration process.

The Government has finalized a complete 4-phase strategic plan, mapped to the overall E-Government implementation plan that transforms the current One Stop Shop to a new architecture for providing the services of the One Stop Shop electronically. The proposed plan includes recommendations for the new application and infrastructure needed to support the process as well as properly link the transformed One Stop Shop to the Government Nervous System.

The stage has now been reached whereby tender documents for the first phases of Web-based registration can be issued.

In addition, some of the other significant projects are being implemented such as the following (as examples).

## *2. Muscat Municipality*

Muscat Municipality has initiated significant work to computerize their administration. They are actively examining and working on important aspects such as the following: -

- (a) To shed light on the concept of providing services through the electronic portals, its applications and how to utilize the electronic means to develop and enhance access to services and information;
- (b) To examine the efforts exerted by the Arab cities and to view the experiences of some cities so as to introduce in their own working.

## *3. Royal Oman Police To Introduce New High-Tech Identity Cards*

Oman will introduce a machine read smart card with stored thumbprint to vouch for personal identity. New identity cards (smart cards) will be issued from November this year to mark the National Day celebrations. The issuing of residence cards to expatriates in Oman and registration of civil status would start in the beginning of 2004 at 12 new registration stations.

The ROP is thus ready to implement the Civil Status Register System.

## B. DIGITIZATION OF INFORMATION

As Oman is establishing a sound information society all the sectors are in the process of electrification of their data & applications. This digitization of information process to convert data into organized databases and electronic codes is a huge process, which will take a long time to reach an appreciable level. Different sectors & departments are on different levels of computer- maturity.

This is being done gradually as more & more applications are being put on-line. Some organizations are already on fairly advanced stages of digitization.

Many Government services are in the process of being digitized as per E – Government / I.T. Strategy.

## C. E-GOVERNMENT PLANS

### 1. *Introduction*

Information and communications technologies (ICT) are transforming economies and societies all over the world. They are also transforming the way government does its business and serves its citizens. A country's position in the world will be determined by the effectiveness with which it addresses the opportunities and challenges in moving to an Information / Digital Society. Building on its achievements over three decades, Oman has ambitious plans to capitalise on the enormous opportunities opening up. One of the first steps has been the commissioning of the National I.T. & E – Govt. Strategy which sets out detailed recommendations and a plan of action to realise these objectives.

### 2. *National I.T. & E – Govt. Strategy*

The National I.T. & E – Govt. Strategy has been extended to cover the full range of digital society issues. An Information / Digital Society reflects a society well advanced in the adoption and integration of digital technology at home, work, education and recreation. E-government is an essential element of such a society, but nonetheless only one element. Equally, e-government in itself is of little value if citizens and businesses do not have the knowledge, incentives or resources to avail of such 'e' services.

### 3. *The Opportunity For Oman*

The implementation of e-government and an Information/Digital Society offer the following opportunities for Oman:

- (a) Streamlining Government services to citizens and business;
- (b) Enabling knowledge-based industries;
- (c) Supporting a better competitive environment;
- (d) Providing employment for Omani youth;
- (e) Enabling better healthcare;
- (f) Improving educational opportunities;
- (g) Supporting tourism;
- (h) Enhancing social development;
- (i) Complementing Achieving the Vision of the Omani Economy 2020;
- (j) Making Oman a more attractive destination for foreign investment.

TABLE 4. THE EXPECTED INFORMATION SOCIETY ACHIEVEMENT\*

<b>Within 3 Years**</b>	<b>Within 8 Years</b>
<ul style="list-style-type: none"> <li>- All government entities have Web presence;</li> <li>- At least 4 entities have full Web transactional capacity;</li> <li>- 3 significant investments by foreign ICT enterprises;- Fair no. of ICT related jobs created.</li> </ul>	<ul style="list-style-type: none"> <li>- 30% of all transactions with government via a unified Überportal;</li> <li>- Government service delivery based on integrated systems and redesigned processes;</li> <li>- Large no. of ICT related jobs created;</li> <li>- Five or more Omani-developed ICT products installed in world markets.</li> </ul>

\*\* During 6<sup>th</sup> five year plan ending 2005.

Source: Digital Society Strategy/Govt of Oman.

### *5. Information Society Readiness For Oman*

- (a) Highly impressive record of economic and social development of the last few decades;
- (b) Stable and peaceful society;
- (c) Large educated young population;
- (d) Strong regional and international ties.

### *6. E-Government Architecture, Applications And Service Delivery Model*

#### (a) *Plans of action*

- (i) Implement a flexible, government-wide network linking all Ministries while minimising the need to change existing applications. We call this the ‘Government Nervous System’ or GNS, and it will form the technological basis for future e-government initiatives;
- (ii) Move the base of applications from a Ministerial focus to the ‘Communities of Interest’ (COIs). This shifts the focus to the citizen or business user, who will be able to interact with the various Ministerial entities in a seamless way;
- (iii) Introduce a primary government portal (UberPortal) through which all citizens will be able to access all government web sites;
- (iv) Support service delivery to citizens over multiple channels (paper, telephone, physical and Internet) using the GNS and the COI application structure to present the citizen with a seamless interface.

### *7. National Telecommunications & E-Payments Infrastructure*

#### (a) *Plans of action*

The national telecommunications infrastructure is the lifeblood of e-government and the Information Society. For it to be effective it has to be reliable, cheap and widely available. The Government has ambitious plans in this regard, such as implementation of broadband access Network throughout the country especially to geographically remote areas.

It should initially be concentrated on schools, health care centres, businesses and cyber-cafes.

Implementation of an e-government payments gateway has been covered in more details in chapter VIII (C).

## 8. *Flagship Projects ("Quick Wins")*

While a number of entities already provide Internet access to information and services, it is important that the Information Society project be seen as getting off to a 'flying start'. This will be greatly helped by implementing a number of projects, which are:

- (a) Having a wide impact on public;
- (b) Relatively easy to implement in a short period;
- (c) Preferably contained within one entity;
- (d) Not requiring massive process restructuring;
- (e) With high degree of readiness.

A few flagship projects (quick wins), which have been identified, are covered in chapter (VI-A)

### D. E-PROCUREMENT APPLICATIONS

One of priority and flagship projects selected is the Govt. tendering site briefly covered below:

#### (a) *Government tendering site*

Permits prospective bidders to obtain information relating to current Government tenders and register with the Government. Currently supports tenders for value greater than 250,000 OMR. This is in the process of further enhancements.

#### *PDO (Petroleum Development Oman)*

Petroleum Development Oman's online bidding has been fairly large, making the company one of the energy sector's foremost exponents of Internet tendering.

A large number of bidders take part in PDO bids. E-Commerce initiatives are also being popularized to encourage even the smallest Omani businessmen to take advantage of the situation and offer competition to others by using an Internet café in the interior.

## VII. APPLICATIONS IN EDUCATION

### A. E - LEARNING

Establishing an e-learning infrastructure for education & training is the key to creating Information & knowledge-based Society.

An e-learning program at a national level is a collaborative effort of both public & private sectors-involving education & training institutions, as well as social, industrial & economic players.

The benefits of e- learning are not only available to the students' community but also to corporate executives, workmen & other staff and to professionals in all fields of economic activities. It makes 24\*7\*365 learning concept possible: at any time to anyone anywhere at one's pace, schedules & customized choice. It enables distance learning & cross-border learning also a reality.

However in spite of wide –spread potential benefits, E-learning has been a slow starter everywhere in the world. In Oman too it has yet to make an appreciable dent & presence. However Oman Govt. has taken some positive initiatives for its introduction.

The Educational Portal is a good start and is being described below:

## B. EDUCATIONAL PORTAL<sup>5</sup>

### 1. *Introduction*

The idea of the educational portal, defined as a means of communication between the ministry's database and those connected with it such as administrators, teachers in all sectors, the Ministry of Education, schools, students, parents and members of the society who are concerned with education. This portal can be accessed by browsing the ministry's website.

### 2. *Objectives*

- (a) Linking the society with the ministry of education the portal aims at linking the largest number of people for provision of electronic services and updating their data;
- (b) Enhancing the quality of the education process through the provision of interactive education by the use of advanced and new tools and technologies. This in turn will lead to improvement of the evaluation process, development of curricula, teaching methods, and the quality of education;
- (c) Providing education outside the classrooms by the use of new technologies is a major part of the educational portal. It will make it possible to apply distance-learning, self –paced learning, visual classrooms and group learning;
- (d) Supporting decision-makers, especially in educational planning, through the provision of recent and accurate data and furnishing them with statistics and reports to facilitate taking high quality decision at the earliest possible time;
- (e) Amalgamating the ministry within the framework of e-government, which will enable the ministry to provide other ministries with the data requirement in an electronically accurate manner and in turn receiving data. This will also enable the ministry to be integrated efficiently within the e-government.

### 3. *The strategies of the educational portal*

This portal is comprised of four strategic areas as follows:

#### (a) *The administrative system*

It aims at providing administrative and organizational database together with various reports and statistics to be used by the ministry staff and others according to their responsibilities.

#### (b) *The support educational system*

This part aims at strengthening the education process through the introduction of new teaching methods characterized by their attractiveness and efficiency, in addition to the provision of education outside the classroom.

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<sup>5</sup> Source: Ministry of Education, I.T. Department.

(c) *The educational and cultural context*

This part aims at transforming all curricula and scientific, literary and history books into an attractive electronic text which are easy to deal with and browse in.

(d) *Training of teachers*

This is especially meant for teachers specializing in curricula development or teaching. All these plans and technologies used in this project will be useless if teachers would not be able to use them efficiently.

(e) *Implementation mechanisms*

We have first to launch Pilot projects to direct all sectors and segments toward this objective. The following are some of the proposed projects:

(i) E-school project

This will be accomplished through use of school administrative system, rehabilitation and redesigning of the local net work, provision of communication services through the internet, establishing school portals and the use of e-mail between school segments.

(ii) E-region project

This involves redesigning and rehabilitation of local area network, provision of internet communication, using systems and technologies in its administrative work, using e-mail among the region's elements and establishing a regional portal.

(iii) E-mail project

The ministry should adopt-e-mail in the correspondence between its different sectors and to provide each of the staff with e-mail facility.

(iv) E-curricula project

Books and teacher's guides should be transformed into electronic texts and promulgated in the ministry's website.

(v) E-culture project

This part aims at upgrading the level of awareness and the applications of the different technologies. Each region is given the chance to identify the nature of the project which serves best its interests according to the special needs of each region. This project should be directed to all the segments including the parents.

## **VIII. APPLICATIONS IN COMMERCE & BUSINESS**

### **A. E-COMMERCE & E- BUSINESS APPLICATIONS (B2B/B2C, STANDARDS & SECURITY)**

#### *1. Introduction*

Commerce and Trade play vital role in the integration of economies. With the widespread use of I.T. & Internet gaining momentum, Oman's enterprising companies both in the public & private sector are modernizing their working in tune with the latest trends.

Many corporate sector companies are conducting B2B transactions using electronic means. B2C is also being introduced by offering electronic facilities spreading more awareness & building-up of infrastructure as a gradual process. The country's finance community is taking a lead in the regions e-banking revolution.



Many major banks, public sector organizations private sector are coming forward to launch e-commerce activities. The endeavors are to create a vehicle from which Oman's business community, particularly the small and medium enterprises (SMEs), can be helped into the world of e-business.

Petroleum Development Oman, Omantel, Muscat Municipality, Bank Muscat, Oman Arab Bank, Oman Aviation, the Public Establishment for Industrial Estates, Oman Establishment for Press, News, Publication and Advertising (Publishers of Oman Daily Observer) are some of the very active organizations in this regard.

## 2. Security Measures

### (a) Security, standards & contingency

This has assumed very special significance in order to create safety and confidence. Starting from E-Legislation to security measures for applications, the standards to be followed as well as the back up/contingency plans are now attracting attention all over the world.

Based on I.T. Strategic studies conducted by the Government, Oman is also set to make serious moves in order to implement an e-government payments gateway.

The real development of e-commerce would depend on the creation of an Electronic Payment Gateway by Omantel or other private companies. "E-commerce is virtually impossible without creating a safe online payment infrastructure. Necessary cyber laws have to be created to facilitate e-commerce,"

A brief note on E-Payment Infrastructure has been included at the end of this chapter whereas Cyber Laws have been briefly covered in chapter 2.

The recent move by Bank Muscat for business Continuity Planning as a part of disaster recovery is laudable and indicates a sense of concern for the business & the customers.

### 3. Bank Muscat Implements Business Continuity Plan

Bank Muscat, one of Oman's largest commercial banks with assets of over \$4 billion, signed an agreement to implement a comprehensive business continuity plan (BCP) to safeguard the bank from any contingent disasters.

The move is aimed at minimizing disruption of Bank Muscat's operations and losses through lost business opportunities and to ensure prompt resumption of normal operations in the event of a disaster. With the continuity plan, the bank can ensure availability of entire banking services such as ATMs, deposits, remittances, loans, treasury, trade and Internet within a few hours of a major disaster.

Many other Banks and establishments are likely to peruse in similar directions.

## B. E-BANKING

Many Banks in Oman & Public Sector are on the move to promote e-banking and e-payments. Some examples:

### 1. Ministry Of Commerce & Industry Initiates E – Payment System With Oman Arab Bank

As per an agreement signed between the Ministry of Commerce & Industry & Oman Arab Bank, OAB Smart Card, an electronic payment system, will be used for settling all types of fees at MOCI. This payment system developed by OAB can be used by all companies of the private sector.

### 2. E – Bank Launch By Bank Muscat

One of the important events to be held recently was, the Bank Muscat e-bank launch. This is bound to give lot of encouragement to e- banking environment in Oman.

### 3. Muscat Municipality Set To Launch E-Payment Gateway

The Muscat Municipality is all set to launch online payment gateway. The payment application has been completed. One can pay electronically when the bank is defined. This service will eliminate unnecessary queuing up at the municipality.

The Municipality is also in the process of setting up kiosks for e-payment. Setting up kiosks all over the capital area will further help people pay electronically.

Another service that the municipality is about to offer, at the same time of the launch of the e-payment gateway, is the setting up of Municipality Service Bureaus which are expected to assist people who do not have access to the Internet, or those who do not know how to handle it, yet would like to pay online.

### 4. E-Payments Infrastructures

#### (a) *Electronic funds transfer*

The Central Bank of Oman is considering introduction of an Electronic Funds Transfer System, which is capable making once off as well as regular payment. It is also issuing tenders for RGTS (Real Time Gross Settlement System) for inter bank payment settlements.

#### (b) *Payment mechanism*

The provision of government services over the Internet requires an electronic payment mechanism. It is estimated that from today through 2006, credit card payments will be used for 75 percent of Internet B2C transactions while other payment instruments gain market share. New payment methods will continue to emerge, but market implementation barriers will hinder their chances for success. The Oman e-government project plans to leverage on the existing payment technologies while evaluating alternatives. This has implications for the banks and the underlying payment systems within Oman. Further payment technologies are being evaluated for Micro-payments. It is expected that telecom carriers will compete with banks/card providers for control of low-value payments for remote services and at unattended physical locations, but traditional banks/card providers will use their extensive payment networks to maintain primary control of traditional card payments through 2010.

#### (c) *Internet payment gateway*

The predominant payment method over the Internet is credit and debit cards currently accounting for about 95% of Internet transactions. There is a need to provide a *payment gateway*, which is capable of accepting and validating credit/debit cards, authorising payment, capturing transaction details and ultimately ensuring that the amount is settled between acquiring and issuing banks. From a technical perspective the payment gateway interfaces between the Government UberPortal and payment processors networks (VisaNet, Mastercard, American Express, etc..) either via an acquiring Bank or direct.

#### (d) *Micro payments*

The primary mechanism for receiving payments over the Internet for government services will be a credit/debit card mechanism. However there are payments below a certain threshold, which cannot be processed economically through existing card networks. For such micro payments other solutions are being considered such as mobile phones and smart cards.

#### (e) *Smart Cards as a Payment Device*

The Oman government has an on-going project to implement a smart card system. The primary purpose of the smart card system is as a national identification scheme. However it should be multi-purpose in nature.

The overall objective will be to provide the convenience of a single, consolidated card, reducing the need to carry and keep track of multiple cards. The infrastructure costs of introducing smart cards should not be underestimated.

There are both advantages and disadvantages of smart cards as a payment mechanism, which must be examined carefully.

## IX. APPLICATIONS IN HEALTH – CARE

### A. DATABASES FOR NATIONAL HEALTHCARE

Oman as a society attaches high importance to the provision of healthcare to all of its citizens. The effective deployment of I.T. will play a vital role in this endeavour. The Sultanate has a total of 56 Hospitals and 118 health centers, plus directorates general, and a few other operations (regional directorates) making about 200 locations in total. Although at present only 9 hospitals are connected to the head quarters, there is an aspiration to connect all sites by 2005.

Certain amount of data is available for healthcare, which is being organized into proper databases. As the computerization in healthcare makes inroads the updates as well as linkages to other hospitals & establishments of relevance will be developed.

#### 1. *I.T. in The Ministry Of Health*<sup>6</sup>

The Ministry of Health took a strategic decision to use I.T. as the main tool to improve the healthcare, re-engineer the processes and at the same time contain the cost. In order to achieve that, I.T. should infiltrate all the healthcare processes.

The Ministry of Health took also another strategic decision to build the healthcare application internally. In this way the Ministry's priorities will be dealt with and also the cost of building these applications will be minimal.

The first *priority* of the Ministry is to computerize all the health institutions by 2005, of which almost 60% is completed. Each institution is a 'cost center' having complete computer infrastructure locally, which operates independently to other institutions. The issue of exchange of information between the health institutions is being dealt separately.

#### (a) *Applications*

The applications cover all aspects of activities in the healthcare, Admin. & Financial, Clinical Engineering and Support. The aim is to make paperless healthcare institutions. All the systems are on-line with some fault lenience to ensure the availability of the systems at all time.

Apart from Govt & public sector hospitals, private health care centers, training institutions and equipment suppliers, software development & support service companies are all contributing. Some of Omani S/W products are making landmark, in AGCC & world markets.

Also in due course telecommunications & teleconferencing for medical-use will be introduced. Health is on doubt one of the prime concerns of the Govt. in which Gov/public & private sector are all encouraged to participate.

### B. TELE – MEDICINE AND TELECONFERENCING

#### 1. *Present Structure*

In the long-term telemedicine will be introduced to reach far off/in accessible areas.

However the structure of the healthcare delivery system in Oman is built in such way that at the moment it does not require the traditional tele-medicine setup. We have Primary Health care covering a limited catchment's area (not exceeding 5,000 people), built and equipped to fulfill only the primary health

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<sup>6</sup> Source: Ministry of Health, I.T. Department.

functions. For any medical condition or health problem outside their area of competence, the patient is transferred to appropriate health institution built and equipped to deal with the case. All the primary healthcare units are provided with a minimum of two ambulances.

## *2. Health E- Education:*

The Ministry in its strategy to enhance the CME (Continuous Medical Education) with the participation of the National Telecom operator is preparing to build large Tele-education infrastructure using IP over ATM. The pilot project will include 5 hospitals and the Ministry's HQ. The complete project will cover all the regional referral hospitals (secondary and tertiary care) and the National referral hospitals (tertiary care).

In this regard e-learning will also be useful to enable medical doctors & supporting staff to acquaint with the latest development and the general public to know the issues of hygiene first aid etc.

## *3. The Provision Of E-Health<sup>7</sup>*

The Ministry has also plans for tele-medicine and other related services. Currently a very high proportion of I.T. resources are used to maintain the in-house developed Hospital Information System and related applications such as procurement. Such applications are large, complex, and continuously changing in line with advances in medicine. The Ministry would be seriously considering redeploying existing I.T. resources to achieve the potential benefits of tele-medicine.

These potential areas include:

- (a) Access to clinical content (knowledge management);
- (b) Currency of practice and continuing medical education functions;
- (c) Enhanced communication capabilities (e.g., secure e-mail, fax, clinician chat rooms and physician connectivity);
- (d) Technologies to gather relevant information (e.g., push technologies for timely distribution);
- (e) Improved administrative capabilities for supply chain management functions;
- (f) Health professionals' access to patient's personal health records;
- (g) Results transmission;
- (h) Patient compliance literature;
- (i) Interfaces to transcription;
- (j) Literature searches;
- (k) Access to best-practice knowledge bases.

## **X. DIGITAL ARABIC CONTENT**

### **A. THE NECESSITY FOR ARABISATION**

While English is widely used in Oman the bulk of the Omani citizenry will interact with the Government via Arabic. Therefore as per I.T. Strategy all initiatives under the Information/Digital Society program must cater for this from the outset.

We believe this will help to bridge the gap of Digital Divide between those who know English and those who do not. By making information accessible in Arabic also it will have better impact on the development of I.C.T Sector in the Sultanate and the common citizen will immensely benefit from the digital revolution.

Moreover such Arabisation will enable more positive coordination between Arab countries to share data & information and ideas & experiences. It will also present a better picture of our culture to the world.

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<sup>7</sup> Ref.: Digital Society Strategy/Govt of Oman.

Access to information as well as processing of information in both English and Arabic contents will also keep us closely integrated with the developments in the rest of the world.

## B. CURRENT SITUATION

In order to make information accessible to the common citizen, the Government has attached high priority to the localisation aspect. Concrete steps are already being taken in many situations, such as:

- (a) The Information & Publication Centre of the Ministry of National Economy brings out its various publications on Economic & Social Statistics both in English & Arabic in regard to various data, which includes census, household surveys, consumer price index, geographical indicators etc.;
- (b) Most of the websites also display information & data in Arabic & English;
- (c) Most of the PCs working in the Government departments are Arabic enabled.

However due to massive computerization programs being initiated, utmost care will be taken in this direction as covered hereunder.

## C. COMPLEXITIES OF THE ARABIC LANGUAGE

Arabic is a very rich language, but this richness gives rise to complexities. Any Arabic presentation on screens has to do contextual analysis since the shape of the character will differ if the character is at the beginning, middle, or end of a word, and may depend on the font used. Therefore conversion software has not just to covert but also take care of shaping the character on the screen based on the contextual analysis of the neighboring characters. Moreover legacy applications developed in Oman were also built with no separation between the presentation and business logic. The conversion software has also to take into account many such peculiarities.

## D. UNICODE: AS A SOLUTION<sup>8</sup>

So far representing Arabic symbols in IT systems was difficult. However, the availability of Unicode makes it much easier today. Unicode is a uniform, standard, character-encoding scheme intended to operate on any computing platform to represent most current human languages.

## E. ACTION PLAN FOR FUTURE DEVELOPMENTS

As per the I.T. Strategy of the Oman Government, e – government plans on digitisation of applications & data are being designed keeping Arabisation aspect in mind.

In order to do it effectively, the following strategic approach has been recommended as a part of the I.T. strategy:

- (a) Operating Systems for all servers, desktops, laptops, and PDA's should support Unicode, and Unicode should be used as the default code page;
- (b) Any database, operational data store or data warehouse system should also support Unicode, with Unicode being defined as the default code page in all such applications;
- (c) Content, knowledge management, messaging and integrated applications should all support Unicode;
- (d) All Terminal Emulation software should support Unicode.

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<sup>8</sup> Ref.: Digital Society Strategy /Govt. of Oman.

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