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**ICT CAPACITY-BUILDING IN
ESCWA MEMBER COUNTRIES**

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INTRODUCTION

Capacity building (refer to frame 1) has become a popular idiom within international organizations and communities. It is progressively delineating new approaches to policy, strategy, management, and execution processes at global, regional, and national levels as well as at the institutional level. The challenges offered by Information and Communications Technologies (ICTs) introduce new elements for developing sustainable initiatives and innovative approaches.

Positive implications of establishing integrated capabilities in the ICT sector in a national economy are a matter of absolute certainty. Indeed, building national capacities in ICTs is essential for the sustainability of the ICT sector. This sector is an essential prerequisite for joining the global knowledge-based economy and for reducing the digital divide that is so apparent in most ESCWA member countries.

This paper intends to discuss the required in ICTs and their development-oriented applications to make the move towards the Information Society and knowledge-based economy. It first describes initiatives of selected countries in the region; then the following sections focus on three main priority areas namely: human resources development through education, research and development establishment, and enterprise promotion for building capabilities in ICT services and manufacturing. Finally, it concludes with important factors for ICT capacity building and a presentation of a framework.

Box 1. ICT capacity building conceptual overview

Components:

ICT capacity building is streamlined into a selected number of pillars that support priority issues for national / regional applications and include developing the capabilities related to:

- ICT policies and strategies;
- Awareness building and dissemination of ICTs;
- Education and training;
- Research and Development (R and D);
- Enterprise promotion.

Target groups:

Capacity building engages several parties to be involved in different processes. These processes support the development of key skills at different level of the following main concerned groups:

- Citizens;
- Public firms;
- Private firms;
- Educational institutions;
- Civil society institutions and NGOs
- International and regional organizations.

Objectives:

Capacity building in ICTs has for main objectives:

- Disseminating ICT applications and their use by developing competence, resources, networks, knowledge base, and infrastructure;
- Developing ICT capabilities with a view to increase productivity and enhance competitiveness;
- Building a sustainable ICT sector and integrating it within a national strategy;
- Setting up Information Society to link up to knowledge-based economy.

I. ICT CAPACITY BUILDING INITIATIVES IN ESCWA MEMBER COUNTRIES

Within the ESCWA countries, efforts are targeting awareness creation on opportunities in the Information Society and in ICT capacity building. Even though most Arab region recognizes these previous two fundamental issues, the current applications for building and accelerating the pace of ICT capacity building are still not fully integrated in national and regional plan. The rest of this section outlines some initiatives in the region¹:

A. EGYPT

Egypt acknowledged the important role of ICTs for growth since the early nineties and launched several initiatives aiming at establishing a national ICT industry through capacity building²; such as setting up government information and training centers, building national databases in various sectors, introducing IT at schools, and establishing ICT faculties at universities.

Other important initiatives are the launching of technology parks such as Pyramid Smart Village that targets ICT projects, and the initiation of the Egyptian incubator programme³ that has resulted in establishing several technology incubators. Moreover, with UNDP support, a number of IT community telecenters were established in the Sharqiya province.

As far as R and D projects are concerned, they are still restricted to universities and few research institutes⁴. More cooperation between private and public sectors is required to support future projects. However, few initiatives are being conducted such as R and D projects that involve the use of ICTs to automate, monitor and operate all water pumping stations (more than 1600) throughout Egypt⁵.

B. JORDAN

Jordanian public and private sectors fully recognize the role of ICT capacity building in developing a wealthy socioeconomic environment. The following is a list of major initiatives⁶:

- In government, a national strategy has been adopted and six ministries have been selected in the ICT fast-track programme;
- In education, a nation-wide integrated distributed database management system aims at connecting 28 Ministry of Education (MOE) directorates to the MOE headquarter in Amman is launched;
- In rural communities, IT community centers have been established to provide services, access and ICT training to local communities;
- The Hashemite University Industrial and Technology Park is expected to generate thousands of job opportunities and attract capital venture investment in Jordan;
- CyberCity is an information technology park that is intended to be setup on a 4.5 square kilometers area located north Amman;

¹ "Technology capacity building initiatives for the 21st century in the ESCWA member countries", ESCWA/TECH/2001/1.

² "New Technologies for enhancing competitiveness and productivity in selected sectors", ESCWA/TECH/2001/4.

³ Launched in 1995

⁴ "New Technologies for enhancing competitiveness and productivity in selected sectors", ESCWA/TECH/2001/4, pages 78 and 79.

⁵ Ibid.

⁶ Ibid, page 81

- REACH is a national strategy to position Jordan as a regional leader and an international exporter of IT products and services. It targets to generate 30,000 jobs by 2004.

In summary, Jordan seems to be moving in the right direction in building national capabilities towards establishing an Information Society.

C. LEBANON

Due the high level of private universities and schools in Lebanon, ICT capacity building is gaining ground in the education sector; however, this growth is an organic growth and more formal initiatives are expected on national level.

An important private initiative is the establishment BERYTECH of a private technopole. The latter focuses on activities related to Information technology, multimedia, Web technology, communications, vocational training, and others activities such as energy.

D. SAUDI ARABIA

The seventh development plan for Saudi Arabia⁷ (2000-2005) tackles the strategic issues of ICTs and its applications in the public and private sectors. Some initiatives are:

- King Abdul Aziz City for Science and Technology (KACST) from one side and private firms from the other intend to create incubators in Saudi Arabia;
- Another initiative is the establishment of a free ICT zone in Saudi Arabia.

E. United Arab Emirates (UAE)

Over the last ten years, UAE invested tremendously in ICT sector in order to move toward knowledge-based economy. It is targeting to be a regional hub for ICT services and manufacturing. Some initiatives are:

- Abu Dhabi Innovation Center aims at establishing several spin-off businesses based on ICTs and media technologies;
- Dubai Internet City and Dubai Silicon Oasis both aim at creating the infrastructure and environment needed to promote ICT enterprises and contribute positively to the growth of knowledge-based economy.

II. MODERNIZING TRAINING AND EDUCATIONAL SYSTEMS

Implementing practical means for ICT capacity building in the education sector is important in the transfer and disseminations of these technologies. In essence, the education sector is the ideal place for nurturing the nation's human capacity building; the latter would eventually become key enabler towards ICT innovation and business incubation, and would contribute enormously to socio-economic development. It is generally a shared view that ICTs can have a positive effect on those that choose to use them, but this necessitates teaching appropriate and effective use of ICTs.

ICT capacity building in ESCWA member countries can be instituted in each country's education programme. Integrating ICTs in the education system constitutes a priority for every Ministry of Education, in addition to teaching ICTs as stand alone subject. Even though this latter computer literacy approach is a start, ESCWA countries need to incorporate ICTs into broader curriculum to extract more gains. Policy

⁷ Source "New Technologies for enhancing competitiveness and productivity in selected sectors", ESCWA TECH/2001/4, page 108.

makers can effectively align curricula, exams, and incentives with the outcome that they hope to achieve by using ICTs in education systems.

In this regard, ICT capacity building tackles three areas in the education sector; namely schools, universities, vocational training institutions and private ICT training centers. In all of these areas, quality is maintained and ICT infrastructure facilities are established.

A. SCHOOLS

Schools embrace ICTs as they bring with them new opportunities for both teachers and students. New talents are learned and applied from within and outside the classroom. Computer labs in schools are just the beginning. ESCWA member countries would have to consider the following priority areas for developing ICT capabilities in schools:

- (a) Incorporating ICTs in schools curricula;
- (b) Training teachers to handle a dynamic student-centered learning environment either in traditional classrooms or in virtual classes; in addition to instituting ICTs as a prerequisite skill for graduating teachers;
- (c) Developing cheaper, safer, and user friendly hardware equipment that allow for greater use among students and teachers;
- (d) Collaborating with local firms to expand ICT usage, such as establishing partnerships with Internet Service Provider (ISP) for cheaper Internet connection and services, most importantly including safer access to the Internet through firewalls;
- (e) Using wireless technologies to reach a wider and more remote rural area to leapfrog the traditional fixed line alternative⁸;
- (f) Opening up public schools computer labs after school hours, on weekends, and on holidays to the community to provide training and Internet access to the local communities; these facilities will eventually lead to IT community centers.

B. UNIVERSITIES

ICTs are not only a powerful tool that open up new prospects for communication and collaboration, they contribute to new job creation and economical growth. With this in mind, Arab universities' contribution to ICT capacity building goes beyond developing basic skills and thus has to produce experts in ICTs. The following priority areas are of prime importance in the university sector:

- (a) Develop postgraduate diploma as well as Masters and Ph.D degrees in ICTs;
- (b) Seek accreditation from leading international universities;
- (c) Modify existing curricula to include ICT skills in all degrees and accelerate diffusion to all universities;
- (d) Partner with private sector to build up necessary skills that would guarantee immediate jobs for fresh graduates and effective results for business firms;
- (e) Partner with the private sector to instigate firms to benefit more from student training and final year projects (if any);
- (f) Transfer of ICT skills from university to industry;

⁸ New technologies, such as third generation GSM mobile and VSAT (Very Small Aperture Terminal), open up new horizons for distant learning as well as introduce ICTs to rural communities.

- (g) Develop a dynamic system to respond and cope with the changes taking place in the ICT sector;
- (h) Introduce ICT as a subject in law degrees in order to build knowledge leading to new and innovative ICT legislations;
- (i) Create an enabling environment for ICT researchers and faculty members;
- (j) Enhance teaching methodologies using ICTs;
- (k) Collaborate with other universities in research centers on local, national and regional levels;
- (l) Align university policies in order to produce a number of ICT graduates according to forecasted market needs;
- (m) Provide on-line education through e-learning, such as establishing virtual universities.

Various forms of ICT capacity building have appeared over the last years. Universities are becoming more proactive in participating and instigating such projects. The most common⁹ are technology incubators, science/research parks, and technopoles¹⁰. Furthermore, several efforts to build ICT capacities in educational sector are taken place in the region.

C. VOCATIONAL TRAINING INSTITUTIONS AND PRIVATE ICT TRAINING CENTERS

There is an increasing demand to acquire affordable ICT education with a view to having access to knowledge and coping with the advances of information and communication technologies. Vocational training and private training centers respond to this market. They provide opportunity to acquire various ICT skills in a short period of time and at an affordable price. They enrich the workforce with a variety of skills and respond quickly to market changes as they deliver new talents in shorter time.

Private training centers are gaining more and more market share as they provide international certifications in different discipline of the ICT industry; such as Cisco Certified Network Professional (CCNP), Microsoft Certified system Engineer (MCSE), and Oracle Certified Professional (OCP).

One of the important objectives for training is to provide computer literacy courses to all segments of the population. Frame 2 below illustrates UNESCO Cairo Office contribution in this matter.

Box 2. UNESCO Cairo Office (UCO) ICT capacity building initiatives

Since 1997, the Upgrading Science Engineering Education (USEE) Programme dedicated special importance to the capacity building of human resources and facilities needed for the rapid incorporation and effective utilization of ICT in education. The Programme has implemented various modalities which are:

- (a) Faculty training workshop
- (b) Faculty Training Visits
- (c) Development of ICT infrastructure
- (d) Development of training kits
- (e) Certification of basic computer skills and knowledge

The last programme aims at building capacity in basic computer skills and knowledge in various government organizations, universities, colleges, schools and training centers. In 1999, the International Computer Driving License (ICDL) was introduced. ICDL, controlled by the European Computer Driving License Foundation (ECDLF), provides an international certificate that is recognized in different countries. Its syllabus consists of seven modules, each of which must be passed before the ICDL certificate is awarded. The modules are:

⁹ For more details about these forms and styles of institutions refer to ESCWA/TECH/2001/1 study on "Technology capacity building initiatives for the 21st century in the ESCWA member countries".

¹⁰ For Example, Saint Joseph University in Lebanon has established a technopole named BERYTECH.

Box 2 (continued)

- (a) Basic concepts of information technology
- (b) Using the computer and managing files
- (c) Word processing
- (d) Spreadsheets
- (e) Databases
- (f) Presentation
- (g) Information and communication

The UNESCO Cairo Office (UCO) has taken active steps to familiarize the Arab Region with the ICDL Programme and its potential benefit as a benchmark for IT basic qualifications and skills. The following countries were contacted Egypt, Jordan, Kuwait, Morocco, Lebanon and Syria.

Source: <http://unesco-cairo.org/Programmes/science/usee/FACULTY.HTM>

In general, vocational training can be considerably enhances in the region once the following priorities are implemented:

- (a) Developing teachers ICT skills and provide labs/classes with ICT equipments;
- (b) Seeking certification form private international firms to complement the market demand;
- (c) Developing more ICT educational materials for vocational training;
- (d) Partnering with private sector to introduce new ICT technical courses based on newly introduced technologies;
- (e) Introducing new courses that target vocational skills training for young people and woman;
- (f) Seeking funds and grants from industry sector to finance ICT research projects.

As an example, frame 3 describes ESCWA initiative in south Lebanon. This initiative aims at providing ICT related courses in order to upgrade skills and build small business capacities for selected groups of people.

Box 3. ESCWA initiative in South Lebanon

Recognizing that people can demonstrate creative potentials to improve their situation when an enabling environment and the right opportunities exist, a project in upgrading skills and small businesses capacities has been successfully launched and is currently being implemented by ESCWA in South Lebanon. With the aim of increasing employment opportunities for people of the region, the project consists of three complementary components: vocational training, small businesses training and a micro-credit scheme. The idea is to upgrade skills and build small businesses capacities for selected groups of people (women, unemployed men, the poor and the young).

Two ICT related courses have particularly attracted popular participation from the local community. A course in Cellular Repair and Maintenance and another in Computer Repair and Maintenance.

ESCWA activities in South Lebanon also include setting up a number of computer laboratories in various schools in the area using the written off computers that are available at ESCWA. This was coupled by training school teachers on the basic use of computers with the hope that they can relay this knowledge to their students in return. A number of courses in basic computer skills have also been conducted in the area and are continuously being repeated due to great pressure from interested candidates.

ESCWA is also presently sponsoring two major studies in South Lebanon:

1. A study based on ICT capacity building for schools will suggest a phased plan of action for upgrading schools in South Lebanon to be in line with the rest of the country in IT teaching. The study is aided by a survey of the state of a representative sample of public schools in South Lebanon in terms of hardware, software and courseware available at present.

Box 3 (continued)

2. Another study is touching on the Internet sector in South Lebanon and will suggest ways and means of providing effective and economic Internet access to individuals and to organizations of all sizes and specializations.

Source: <http://www.escwa.org.lb/about/pptc/south/tracks/vocational.html>

III. INVESTING IN RESEARCH AND DEVELOPMENT (R AND D)

If the education sector is the ideal place for nurturing the nation's human capacity building, then R and D are the best place to develop ICT innovations. These institutions aim at discovering new knowledge about products, processes, and services, and then applying that knowledge to create new and improved ones that responds to market demands. Main stakeholders in R and D projects are government, industry, universities, national research institutes, public R and D centers, financial sector, and the general public.

Within the ESCWA member countries, priorities for research and development investment need to be identified. These priorities will then launch initiatives that can increase national research management skills, build leading ICT capabilities, and produce commercial opportunities. Research activities can be organized within thematic categories such as e-learning, e-health, e-commerce, e-government, and e-business. Suggested R and D priorities for ESCWA member countries:

(a) Establishing centers of excellence in the following fields:

- Software industry: develop human resources expertise by providing an environment rich in information and knowledge and complemented with advanced training on state of the art software development technologies; such as mastering software development using Computer-Aided Software Engineering (CASE) tools, develop project management software metrics programs to assess quality, manage risk, track cost, and improve process control¹¹;
- ICT policy makers: develop special skills for regulators, policy makers, and managers in this field. This center of excellence could eventually become a regional training center for professionals as well as provide consulting services.

(b) R and D to boost creativity: R and D expose government, enterprises, universities, and local organization to innovation and thus stimulate creativity. In many Arab countries people still are educated to apply what is coming from abroad and not to create their own solutions. Suggested initiatives could trigger an industry based on ICTs to create animated movies in Arabic language similar to the Disney and Manga animated movies;

(c) R and D projects in ICTs fusion with local traditional industry: In an attempt to build the workforce capabilities and to increase productivity of traditional local industries, ESCWA countries could invest in setting up a technology incubator as a model for a national initiative to implement ICTs in selected industries. This model would diffuse technology in related manufacturing sectors, retain innovators and researchers, provide technical support by collaborating with research centers and universities, and contribute to a knowledge-based economy and new growth economy. Typical example could be in the apparel and tapestries design and manufacturing;

(d) Since some of the R and D projects require more capital and by nature necessitate pooling of diverse organizations, it is quite often the case to witness a partnership among different countries

¹¹ Other potential areas for R and D would be: Arabic natural language processing with speech input/output command functionalities, Arabic OCR, Arabic full indexing technique, etc.

in order to share expertise/knowledge and minimize risk/cost. Such initiatives have to be on the agenda of each country and synergies for partnerships among governments need to be developed.

IV. PROMOTING ICT ENTERPRISES

The third major component that contributes to national ICT capacity building is the promotion of ICT enterprises in private and public sectors. From an economic point of view, ICTs can benefit enterprises and increase national GDP¹² in developing countries. Enterprise capacity building demands proactive thinking, coherent management, knowledge base and coordination of expertise. The priorities in this area are:

(a) Increasing the use of open-source software in different sectors, through:

- Identifying and promoting a network of open source experts to assist public, private, and NGO in the use of freeware solutions;
- Conducting national and regional workshop;
- Developing packages using freeware technologies for commercial purposes by the private sectors;
- Encouraging usage of freeware solutions in SMEs.

(b) Setting up regional hardware manufacturing and assembly facilities, by:

- Conducting feasibility study and search for a niche market¹³;
- Removing all payment of import duties on raw materials;
- Simplifying all procedures related to import, export, licensing and inspection in order to increase the velocity of business; the latter will lead to lower production cost and lower number of inventory. Fame 4 describes India's efforts to unify hardware domestic and export manufacturing.

Frame 4. Indian Scheme for unification of hardware domestic and export manufacturing: S-BIT

"The S-BIT scheme (Soft Bonded IT Units) is one of the main highlights of the IT Action Plan. It envisages a common manufacturing facility for both the domestic and the exports market. Under the current policy structure, an entrepreneur needs to invest in separate manufacturing facilities for exports and domestic markets, thus leading to under-utilization of both the capacities and no benefits of economies of scale. The scheme proposes creating a system that would be based on fiscal controls rather than physical controls."

Source: <http://www.indiaonline.com/cyva/repo/pcmk/ch10.html>

(c) Promoting software development industry by:

- Establishing forums at international level to represent local IT software firms;
- Removing taxes on software firms;
- Enforcing Intellectual Property Rights (IPR);

¹² ITU estimates that adding one mobile telephone/100 inhabitants increases GDP per capita by just under 1,000 USD. Source <http://oracle02.ilo.org/dyn/empent/docs/F1089912836/WP17-2001.pdf>

¹³ Potential projects would be to develop a childproof multimedia PC that is easy and safe to use, and it comes preloaded with a set of education software. This PC should not be affordable in order to penetrate more homes and thus build local capabilities.

- Offering more incentives to keep highly skilled talents;
 - Strengthening quality assurance norms in software development and production;
 - Encouraging Small and Medium Enterprises (SMEs) to participate in the software industry;
 - Seeking partnership with international firms.
- (d) Initiating e-government, e-commerce, e-health, e-learning, and e-business development projects. All these projects will develop ICT capacities in the following respective sectors: government, trading, healthcare, educational and business sectors.

One way to develop ICT enterprises and startups firms is to build new institution forms (refer to Box 5). The latter create strong links between industry and ICT R and D thus enabling innovation development.

Box 5. New institutional forms for ICT capacity building

The following list provide a brief definition of most common forms of institutions:

1. Technopoles: they extend over a well-defined geographical area where scientific and industrial activities are co-located, and where exchanges of expertise are greatly facilitated, owing to the proximity of the various institutions and their willingness to collaborate;
2. Technology Parks: they are similar to technopoles, but with more emphasis on the transfer of technological know-how and industrialization;
3. Science/research parks: they are parks in which scientific R and D activities are predominant, whether in co-operation with research laboratories at universities or research institutes in the same location or somewhere nearby, is known as a "Science Park" or a "Research Park";
4. Innovation centers: they are capacity-building initiatives based on incubation schemes. Their principal aim is to help new high-technology firms survive their pre-launch, launch and early operational phases;
5. Center of excellence: they emphasize distinctive aspects of their output that set them apart from other institutions in the same field;
6. Technology incubators: they are a special form of business incubators. They focus on new enterprises whose operations are based on novel technological ideas that are likely to lead to a marketable new product;
7. High-tech industrial clusters: they are groups of entities from various sectors that use relatively large amounts of each other's products and are characteristically based on innovative efforts and/or production linkages;
8. Innovation networks: they include managers, bankers, venture capitalists, professors, graduates, scientists, artists and government employees working on, or toward, innovation-related targets in a variety of application areas;
9. Virtual research centers/networks: they can lead to virtual laboratories where widely separated researchers work with colleagues in different countries on specific projects or fields of knowledge.

Source: ESCWA/TECH/2001/1 study on "Technology capacity building initiatives for the 21st century in the ESCWA member countries", page 4.

V. IMPORTANT FACTORS FOR ICT CAPACITIES BUILDING

Nowadays, ICT capacity building evaluation has augmented in importance because of concerns about failure in implementing costly technology related programmes, mainly due to lack of sustainability and scarcity of human and financial resources. These concerns have incited the following important factors related to successful implementation of ICT capacity building:

- Developing awareness creation process based on success stories;
- ICT projects have to serve a country's values and goals;

- Women need to be formally involved in capacity building programmes, especially that ICTs offer flexibility of work location;
- Poor and isolated segments of the population need ICT projects that bring livelihood to their communities;
- ICT pilot projects followed up with a phased approach for launching any initiative are highly recommended;
- Partnerships have to be built around education, private, and government sectors;
- International organization can provide technical assistance and access to financial grants and funds;
- People who develop ICT skills often find rewarding jobs abroad – keeping skilled human resources in the country remains an important national concern.

VI. FRAMEWORK FOR ICT CAPACITY BUILDING

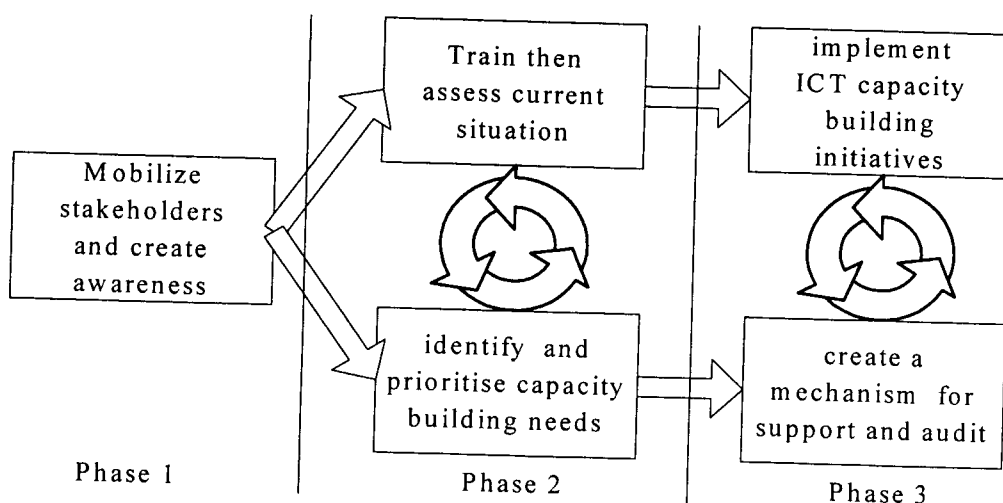
The following describes the three phases that may constitute a national framework for building ICT capabilities in ESCWA member countries (refer to figure 1):

Phase 1 initiates a well-targeted communications campaign. The campaign will cover five major sectors; namely (a) government, (b) private sector, (c) educational institutions, (d) research and development centers, (e) and Non Governmental Organizations (NGOs). This campaign should target decision makers and managers as well as stakeholders from different sectors and experience.

Phase 2 complements awareness creation with training on topics that are critical in the process of ICT capacity building. An interactive pre-training preparation is needed to identify the topics that will be covered. The training sessions will be viewed as a hands-on training that includes case studies and project development opportunities. Suggested topics for these training sessions are: Information Society, knowledge-based economy, policies and regulations, conceptual model for new firms structure in linking up to the global economy, and the critical role of educational institutions, R and D centers, and ICT projects in building local capacities and paving the way towards an Information Society. The next step in this phase is to assess existing policy, regulatory, and legal framework in relation to ICTs in order to identify and prioritize changes in these areas that enable and encourage development of relevant, sustainable, and effective ICT growth options. The changes will essentially create opportunities for private sector, NGOs, and international organizations to play an active role in provision of ICT related capacity building applications.

Phase 3 implements pilot ICT capacity building projects together with a mechanism that supports deployment as well as provides audit throughout the project life cycle.

Figure 1. Framework for ICT capacity building



CONCLUSION

The use of ICTs, even if not at the desired rate, is expanding in ESCWA member countries. It is crucial that Arab countries anticipate this coming tide and develop socio-economic initiatives that take advantage of the opportunities presented by ICTs. Capacity building, as presented in this paper, goes beyond expanding basic ICT skills among citizens; it actually intends to develop experts in various ICT fields starting from the education institutions, through R and D centers, and finally reaching full-fledged ICT-based enterprises in local, regional, or global markets.

Furthermore, ICT capacity building paves the way for revitalizing and developing the ICT industry. The latter plays a major role in expanding existing markets, creating new jobs, increasing exports, in addition to integrating with global economy.

