

IT Sector Development Concept Paper

Prepared for the USAID-Funded
Competitive Armenian Private Sector Project

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DESCRIPTION/EXECUTIVE SUMMARY

Global SPC has prepared the “IT Sector Development Concept Paper” by the request of the USAID-funded CAPS project in support of the strategic goals of the Armenian Government to forge a robust Information Technology (IT) sector and to create a viable E-Society in Armenia. The Concept Paper and the attached annexes such as the initial presentation for the group and the sector development outlines (see Annexes 4 and 5) have been prepared by Global SPC, in close coordination by CAPS staff and have been presented to the Ministry staff and the special Working Group on IT Sector Strategy Development, created by the President of Armenia. All these documents have been discussed and approved by the Working Group during several meetings and personal interviews with sector leaders. Materials and reports developed and presented have been taken as the base for the creation of the Action Plan for IT sector development along with the Road Map 2018 prepared by Competitive Armenian Private Sector project (CAPS) on the basis of Global SPC materials and personal research of the independent consultant.

Global SPC holds that the true lasting success of IT sector development depends on the involvement of all related stakeholders in the process of sector development. In this way, this Concept Paper contends that state initiatives to develop the IT sector must aim at supporting the longer term goal of attaining sustainable growth in the IT sector through private sector involvement in decision-making; provision of such initiatives as the creation of an open business climate capable of attracting and maintaining greater levels of foreign direct investment (FDI); the formation of flexible fiscal and tax regimes; the attainment of overall competitiveness in human capital; and the development of policies designed to support innovation.

In this respect, consistent IT-supportive policies, as well as the institutionalization of the IT-related decision-making process (for a detailed institutional structure see Annex 6), serve as leading indicators of state efficiency and as primary drivers of competitiveness. Based on the experience of other countries, that have succeeded in the development of their respective IT sectors, to attain a high-tech and knowledge-based economy, which is presented in more detailed in Annex 7, Armenia needs to concentrate developing both its IT production sector and E-Society mechanisms.

There is also an important foundation for meeting these goals already in place in Armenia, however, as the government of Armenia has consistently stressed the importance of investing in the development of IT sector and the role of E-Society formation for the overall success of the country in its most recent 2007 Government Plan. Thus, with an official recognition of the Armenian IT industry as a priority sector of the economy, Global SPC sees a unique opportunity to develop a globally competitive IT production sector capable of satisfying the local demand for creating a viable E-Society and assuring international demand for specific IT-related products, thus positioning the country on the international IT map.

One specific target highlighted in this Concept Paper is to promote the even development of E-society and IT production in the regions of the country. Moreover, the Armenian government and corresponding public organizations of the sector believe that the creation of a strong IT sector would contribute greatly to the economic development of Armenia, having a “spin-off” effect on all other sectors, thereby helping to spur the creation and consolidation of a knowledge-based economy.



This Global SPC Concept Paper further identifies specific hypothesis and actions to be taken for IT sector development. Moreover, Annex 3 provides a timeline for each group of activities, showing the priority of actions to be taken by years. Further, Annex 1 and 2 also provide a detailed value chains for IT Sector and E-Society, identifying the key actions and major areas to be addressed for the development of the sphere.

Global SPC has also stressed the importance of including monitoring and evaluation mechanisms. The development of the Armenian IT sector requires a consistent and continuing monitoring and evaluation mechanism capable of ensuring IT sector empowerment. Moreover, such a continuous monitoring and evaluation mechanism must be in place for all stages of strategic development and implementation, and as a core component of IT policy.

Thus, it the goal of this Global SPC Concept paper to fully embrace and support the strategic goals of the Republic of Armenia's Ministry of Trade and Economic Development in developing a robust Information Technology (IT) sector and to create a viable E-Society in Armenia. Only through meeting these dual goals can Armenia achieve a true and lasting knowledge-based economy.

Overview of Armenia's Framework for IT Development

Since an official declaration in 2000 identifying the country's Information and Communication Technology (ICT) as a strategic priority, the Armenian government has recognize the need to establishment a complete legislative, regulatory and institutional framework as an important prerequisite. In order to meet this goal, Armenia has formulated a series of important milestones, ranging from the adoption of IT-related legislation to become signatory to several significant international conventions and treaties pertaining to global ITC standards.

As part of this commitment to creating the framework necessary for sustainable IT development, in 2001, the Armenian government developed an ICT Master Strategy and ICT Implementation Plan to promote IT and establish Armenia as a regional ICT hub. Later that same year, it also approved an ICT Development Concept Paper and Action Plan prepared by the Ministry of Trade and Economic Development in May 2001. A third element was provided by a 2001 presidential decree, which formed a new Information Technologies Development Support Council of Armenia (ITDSC), chaired by the country's Prime Minister, and including several relevant parties and stakeholders. A subsequent institutional step followed in 2002, with the establishment of the Enterprise Incubator Foundation in 2002.

For its part, the Armenian parliament also adopted several important legislative initiatives and reforms designed to support IT sector development. These legislative efforts began as early as 2000, when the parliament adopted the Law on Scientific and Scientific-Technical Activity, providing a framework for state R&D efforts. After several legislative reforms, additional new laws were adopted in 2003, and included the Law on Freedom of Information, which provides rudimentary framework for public access to government information, decisions and legislation, and the Law on Public Notifications, which regulates the terms and procedures of public notifications through the Internet and includes e-government programs, such as Internet-based procurement.

In 2004, the Armenian parliament also passed the Law on Archive Operations, a measure regulating the collection and storage of information, but with basic privacy protections covering medical records and some personal data. Later that year, it also adopted the Law on Electronic Digital Signature, which regulates issues related to electronic documents and governs the form and use of electronic digital signatures in the area of electronic commerce (or e-commerce). Through the following two years, the parliament then adopted the 2005 Law on Electronic Communication, which modified the Criminal Code to include computer crimes, and the 2006 Law on State Support to Innovation Activities. The latter continues to serve as the legislative basis for the country's Innovation System Development Program for the period 2005-2010, a plan that envisages the creation of a national innovation system through the establishment of institutions in the scientific-technical and industrial-technological areas, the formation of venture and innovation funds, techno-parks, business incubators, and the promotion of scientific and educational institutions engaged in technology transfer.

Currently, the Armenian parliament is considering a draft Law on Information Technologies, Information and Information Security, a move that promises to further prepare the foundation for a more ambitious and extensive effort of IT development. And in April 2007, a group of leading Armenian IT sector representatives met with Armenian President Robert Kocharian and discussed several key problems in the IT sector and reviewed measures necessary for attaining lasting growth in the IT sector. It was during this meeting that the Armenian president established a new inter-governmental working group, under the leadership of Minister for Trade and Economic Development Nerses Yeritsyan. This working group is empowered to study and create a new IT Action Plan to direct, develop and monitor the implementation of a cross-sectoral effort to forge modern IT and E-Society sectors in the Republic of Armenia.

Timeline: Armenian Government Milestones

The establishment of a complete legislative, regulatory and institutional framework is an important prerequisite for the development of the Armenian IT sector. The following is a brief overview of the relevant elements of such an IT-related framework:

- 2000 Armenian government prioritizes Information and Communication Technology (ICT);
- 2001 Develops ICT Master Strategy and ICT Implementation Plan to promote IT and establish Armenia as a regional ICT hub;
Approves ICT Development Concept Paper and Action Plan prepared by the Ministry of Trade and Economic Development in May 2001;
Presidential decree forms Information Technologies Development Support Council of Armenia (ITD-SC), chaired by Prime Minister, in July 2001;
- 2002 Establishes Enterprise Incubator Foundation in 2002;
- 2006 Armenian parliament ratifies Council of Europe's Convention on Cybercrime, in March 2006.

Legislation & Regulatory Achievements

- December 2000 Law on Scientific and Scientific-Technical Activity: framework for state R&D;
- September 2003 Law on Freedom of Information: provides rudimentary framework for public access to government information, including directives, decisions and legislation;
- November 2003 Law on Public Notifications regulates the terms and procedures of public notifications through the Internet, with e-government programs, including Internet-based procurement;
- June 2004 Law on Archive Operations: regulates the collection and storage of information, with basic privacy protections covering medical records and some personal data;
- December 2004 Law on Electronic Digital Signature regulates issues related to electronic documents and the form and use of electronic digital signature. The area of electronic commerce (or e-commerce);
- July 2005 Law on Electronic Communication: modified the Criminal Code to include computer crimes;
- June 2006 Law on State Support to Innovation Activities: serves as legislative basis for the Innovation System Development Program for 2005-2010, which envisages the creation of a national innovation system through the establishment of institutions in the scientific-technical and industrial-technological areas, the formation of venture and innovation funds, techno-parks, business incubators, and the promotion of scientific and educational institutions engaged in technology transfer;



I. INTRODUCTION

The goal of the given concept paper is to provide basis for the sustainable development of IT sector and creation of viable E-Society in Armenia.

A number of countries have prioritized the development of their respective Information Technology (IT) sectors as the cornerstone to building a knowledge-based economy. The success of IT sector development depends on the involvement of all related stakeholders. Government initiatives to develop the IT sector must aim at supporting the longer term goal of attaining sustainable growth in the IT sector through such initiatives as the creation of an open business climate capable of attracting and maintaining greater levels of foreign direct investment (FDI); the formation of flexible fiscal and tax regimes; the attainment of overall competitiveness in human capital; and the development of policies designed to support innovation.

In this respect, consistent IT-supportive policies, as well as the institutionalization of the IT-related decision-making process, serve as leading indicators of state efficiency and as primary drivers of competitiveness. Based on the experience of other countries that have succeeded in the development of their respective IT sectors, to attain a high-tech and knowledge-based economy, Armenia needs to concentrate on the development of both its IT production sector and E-Society mechanisms.

Realizing the importance of IT sector development not only as a separate sector but also as a vital pillar for overall economic development of the country and a mechanism for improving the competitiveness of Armenian economy globally, the government of Armenia and the President have stressed the importance of investing in the development of IT sector and the role of E-Society formation for the overall success of the country in its 2007 Government Plan. Previously, on December 28, 2000, the Armenian government had officially identified the IT industry as one of the priority sectors of the Armenian economy.

Based on all these, Armenian government currently seeks to develop a globally competitive IT production sector capable of satisfying the local demand for creating a viable E-Society and assuring international demand for specific IT-related products, thus positioning the country on the international IT map. One specific target is to promote the even development of E-society and IT production in the regions of the country. Moreover, the Armenian government and corresponding public organizations of the sector believe that the creation of a strong IT sector would contribute greatly to the economic development of Armenia, having a “spin-off” effect on all other sectors, thereby helping to spur the creation and consolidation of a knowledge-based economy.

II. DATA ON IT SECTOR

The state of the Armenian IT sector can be described as a “self-matured” achievement directed mostly at outsourcing activities. Factors such as a historically developed scientific research capability and a comparatively educated workforce have played a vital role in establishing and positioning the contemporary IT sector in Armenia. Currently, the IT sector in Armenia has sufficient potential for attracting foreign and local investors. In 2005, the Armenian IT sector generated around \$84 million, an increase of over 54 percent as compared to \$38 million in 2003, comprising around 1.7 percent of Armenia’s GDP in 2005.

There were 160 IT companies operating in Armenia in 2006, of which 50 were foreign companies. In 2006, the Armenian software and services sector earned roughly \$84 million in total revenue, resulting in a 30 percent compounded annual growth rate during 1998-2006 (in 1998, the software and services sector posted \$10 million in revenue). This turnover figure constituted 1.3 percent of Armenia’s \$5 billion nominal GDP in 2006, a level close to the IT sector’s share in GDP for such countries as India (1.4 percent) and Germany (1.3 percent).

The number of foreign IT companies increased to about 50 in 2006, comprising 30 percent of the IT market. A greater recognition of Armenian software development has attracted a greater number of foreign investors in the Armenian market. Compared to 2003, the share of European investment (from 17 to 23 percent) and U.S. investment (nearly 70 percent) in the Armenian IT sector increased significantly, while the share of Russian/CIS investment decreased by 70 percent.

Around 70 percent of Armenian IT companies are engaged in exports to a various degree, with some garnering only a small portion of their revenues from exports, while others are 100 percent export-oriented. Armenian IT exports constitute \$52 million in 2006, which is exported to more than 20 countries. Nearly 60 percent of the exports go to the United States and Canada, followed by the European Union, accounting for 20 percent of Armenian IT exports, and another 16 percent of IT exports to Russia and the CIS countries.

IT-related workforce in Armenia consisted of 4,700 specialists in 2006, following a compounded annual growth rate of about 17 percent from 2003 and approximately 21 percent from 1998. The main limitation of the Armenian IT sector growth stems from the inadequate capacity of educational institutions to cope with mounting demand of the IT industry for high-qualified graduates. Almost 70 percent of the workforce consists of technical specialists, such as software engineers, analysts, developers, project managers, and others. About 3,150 of workforce specialists are employed in the services sector, with around 410 working for internet service providers (ISPs).

According to World Bank Knowledge Economy Index compared to other countries, indicators that reflect the development of IT sector and E-Society of Armenia are as follows:

| INDICATOR | ARMENIA | ESTONIA | KOREA | ISRAEL | IRELAND | INDIA | G7 |
|--|----------|-----------|-----------|-----------|-----------|----------|-----------|
| Annual GDP Growth (%), avg 2001-2005 | 12.3 | 7.6 | 4.5 | 2 | 5.3 | 7 | 1.64 |
| GDP per Capita (in/nal current \$ PPP), 2005 | 4,945.30 | 15,477.90 | 22,028.90 | 25,864.30 | 38,504.70 | 3,452.50 | 32,592.29 |
| Human Development Index, 2004 | 0.77 | 0.86 | 0.91 | 0.93 | 0.96 | 0.61 | 0.94 |
| Intellectual Property Protection (1-7), 2006 | 2.8 | 4.6 | 4.6 | 5.5 | 5.3 | 4.5 | 5.74 |
| Days to Start a Business, 2006 | 24 | 35 | 22 | 34 | 19 | 35 | 13.43 |
| Regulatory Quality, 2005 | 0.12 | 1.43 | 0.77 | 0.89 | 1.56 | -0.34 | 1.31 |
| FDI Inflows as % of GDP, 2000-05 | 4.9 | 10.3 | 0.9 | 3.1 | 8.9 | 0.9 | 2.34 |
| Researchers in R&D / Mil. People, 2004 | 1,605.93 | 2,523.00 | 3,187.00 | 1,569.74 | 2,674.00 | 119 | 3,411.71 |
| Total Expenditure for R&D as % of GDP, 2004 | 0.25 | 0.91 | 2.64 | 4.46 | 1.21 | 0.85 | 2.21 |
| University-Company Research Collaboration (1-7), 2006 | 2.7 | 3.9 | 4.6 | 5.2 | 4.6 | 3.6 | 4.64 |
| Patents Granted by USPTO / Mil. People, avg 2001-05 | 0.4 | 2.65 | 88.44 | 163.81 | 42.45 | 0.3 | 146.45 |
| High-Tech Exports as % of Manuf. Exports, 2005 | 0.7 | 17.6 | 32.3 | 13.9 | n/a | 4.9 | 20.2 |
| Private Sector Spending on R&D (1-7), 2006 | 2.7 | 3.8 | 5.1 | 5.3 | 4.7 | 4.2 | 4.91 |
| Internet Access in Schools (1-7), 2006 | 2.4 | 6 | 6.4 | 5.8 | 5 | 3.8 | 5.53 |
| Public Spending on Education as % of GDP, 2005 | 3.2 | 5.7 | 4.6 | 7.3 | 4.5 | 3.7 | 5.11 |
| Quality of Science and Math Education (1-7), 2006 | 3.8 | 5.3 | 5.1 | 5.3 | 5.3 | 5.7 | 4.96 |
| Extent of Staff Training (1-7), 2006 | 2.8 | 4.8 | 5.2 | 5.1 | 5.4 | 4.8 | 5.17 |
| Quality of Management Schools (1-7), 2006 | 3.1 | 4.9 | 4.3 | 5.6 | 5.5 | 6 | 5.36 |
| Brain Drain (1-7), 2006 | 2.6 | 3.9 | 3.7 | 4.9 | 5.5 | 3.7 | 4.7 |
| Total Telephones per 1,000 People, 2005 | 298.6 | 1,402.10 | 1,285.60 | 1,544.50 | 1,501.00 | 127.7 | 1,406.60 |
| Computers per 1,000 People, 2005 | 66.1 | 482.9 | 544.9 | 741 | 494.3 | 15.5 | 584.74 |
| International Internet Bandwidth (bits per person), 2005 | 11.9 | 3,565.86 | 1,030.48 | 2,498.71 | 6,043.33 | 18.27 | 5,204.46 |
| Internet Users per 1,000 People, 2005 | 53.4 | 512.6 | 683.5 | 470.3 | 275.7 | 54.8 | 521.89 |
| Price Basket for Internet (US\$ per month), 2005 | 52.48 | 10.78 | 32.62 | 22.02 | 31.06 | 6.78 | 15.65 |
| Availability of e-Government Services (1-7), 2006 | 1.82 | 6.45 | 5.15 | 5 | 5.89 | 4.06 | 4.84 |
| Extent of Business Internet Use (1-7), 2006 | 3.2 | 6 | 6.1 | 5.4 | 4.9 | 4.6 | 5.36 |
| ICT Expenditure as % of GDP, 2005 | n/a | n/a | 6.9 | 8.3 | 4.4 | 5.8 | 6.6 |

III. CURRENT STATE AND POTENTIAL FOR THE DEVELOPMENT OF THE ARMENIAN IT SECTOR

During the last 5-7 years, the Armenian IT sector has matured, mainly due to private sector initiatives and foreign investment and, as a result, Armenia's IT sector is predominantly based on outsourcing activities and does not sufficiently contribute to the economic development of the country. Although the Armenian IT sector is endowed with comparatively highly-educated IT specialists, the current educational system remains generally incapable of supporting an adequate supply of qualified specialists to supply IT market demand due to insufficient university-industry cooperation, a lack of competent academic staff and a low-level of resources.

Armenia is also in serious need of relevant legislative, market and institutional infrastructures, as well as e-society components, for the development of a truly resilient IT sector. Although Armenia has liberalized customs and trade policies, the customs administration remains hindered by inefficiencies and redundancies. There is a mandatory need for upgrading the customs policies for importing IT products, which are identified by private companies as one of the major obstacles for sector development.

The IT sector holds a high potential for growth but lacks substantial components that would spur the development of Armenian IT production in the international arena. The major pitfalls facing Armenia's IT sector are concentrated in four major areas: the development of IT-related R&D policies, the strengthening and improving of the capacity of IT-related human capital, the creation of financial and fiscal policies, and the facilitation of IT-specific investment attraction. Taking into account that Armenian R&D and innovation receive only nominal state support and the state fails to provide adequate infrastructure for IT and E-Society development, there is a need to:

- Create a proactive IT-supportive institutional, policy and regulatory environment;
- Improve the educational system to create specializations capable of upgrading Armenia's IT workforce capabilities and competitiveness, as well as forging collaboration between universities-industry-IT sectors;
- Create a state-of-the-art IT infrastructure, with unified e-platforms and shared networks through public-private partnerships;
- Enhance international cooperation in R&D, while attracting foreign capital to the IT sector in the form of risk and venture capital;
- Develop mechanisms for sectoral assistance based on cost/benefit analyses;
- Support IT start-ups and attract major international IT companies to the country;
- Upgrade the quality of Armenian IT products through the imposition of production standards and enhancing the development of Armenian IT product branding in local, regional and international markets.

Concerning E-Society development, the government has already started the process of creating a unified electronic communication network for state institutions aimed at ensuring interoperable security and compatibility, and establishing modern communication and informational systems between various state bodies, agencies and ministries. The first components of e-government have been already been put into operation in Armenia, with the widespread introduction of a broadband optical network as the last phase of implementation.

The state of Armenia’s “E-society” remains plagued by a general lack of public awareness and a low level of E-literacy, however, which have impeded the development of a concept of “E-citizenship” in Armenia, whereby the ordinary Armenian citizen becomes directly engaged as a consumer and participant in the country’s emerging E-society. The fundamental limitations and strengths within the identified areas related to IT sector and E-Society development include:

| LIMITATIONS | STRENGTHS |
|--|--|
| <p>Government</p> <ul style="list-style-type: none"> • Ineffective protection and weak enforcement of Intellectual Property Rights (IPR) measures for IT-related products (high level of piracy); • Lack of financial incentives to attract investments and lack of incentives for promoting R&D activities in IT-related production; • Incomplete IT-related laws and regulations and burdensome business barriers; • Incomplete legislative framework for E-Society and weak E-Regulations; • Diminishing competitiveness of Armenia’s IT sector in the international arena due to Armenian currency appreciation; • Incomplete E-Government measures and inadequate mechanisms; • Limited Internet and broadband penetration, absence of unified platforms, underdeveloped infrastructure and facilities. <p>Private Sector</p> <ul style="list-style-type: none"> • Low level of local and international demand for the development of IT products (low level of Diaspora involvement), lack of international and bilateral agreements and programs; • Limited financing for the IT sector, absence of venture capital; • Lack of specialized IT education, limited IT specific workforce and opportunities; • Ineffective company management mechanisms; • Absence of adequate capital and stock markets; • Low-level of E-Product demand and limited E-Services; • Limited financing for E-Society initiatives. <p>Public Sector</p> <ul style="list-style-type: none"> • Lack of IT special segments (undefined development strategy); • Insufficient mechanisms for technology transfer; • Weak Public-Private Partnerships in IT sector and ineffective university-industry cooperation; • Insufficient presence of incubators and techno-parks; absence of special free zones; • Lack of public awareness and low level of E-literacy. | <p>Government</p> <ul style="list-style-type: none"> • Government recognition of IT as priority sector; • IT Action Plan and Master Plan underway; • Some legislative framework for promotion of innovation and e-services in place; • Budgetary funding for IT sector development; • Tariff-free exports; • Basic e-government services; • Basic IPR laws in place. <p>Private Sector</p> <ul style="list-style-type: none"> • Skilled and young labor force; • Ability to create new solutions; • Ability to satisfy international demand for specific products (outsourcing); • International links though project-based interest and engagement; • Sufficient number of SMEs in the sector; • Capacity to expand use of IT products in other sectors; • Ease of business registration; • First venture project in place. <p>Public Sector</p> <ul style="list-style-type: none"> • Involvement of international organizations and local NGOs in IT sector related decision-making process; • Incubator provides consulting support to IT firms; • Comparably strong R&D base. |

Taking into account the current state of Armenian IT sector and by assessing the unexplored capabilities, the potential for Armenia’s IT sector development rests on six pillars:

- The creation of competitive IT products and services for domestic and international markets backed by foreign capital;
- The emergence of Armenia as a haven and platform for major international IT companies;
- The balanced development of the country’s regions (Internet penetration, E-Literacy level, and IT production);

- The formation of a viable E-Literate society;
- The role of Armenia as IT gateway and IT product access point for CIS markets;
- The creation of an Armenian IT brand and the positioning of Armenia in the global IT arena.

Therefore, based on the strength of the current Armenian IT sector but also taking into account its weaknesses, the following key factors are essential for creating a successful IT sector, derived from the unique conditions of Armenia and from other countries' experience in IT sector development.

KEY SUCCESS TASKS FOR SECTOR DEVELOPMENT

- Improved legal framework
- Strong IPR enforcement mechanisms
- Demand driven education and professional workforce assurance
- Business re-engineering
- Strong R&D Base (strategic and applied research, technology transfer, and R&D commercialization)
- IT sector segmentations
- Assurance of transparency in government activities, minimization of corruption
- Access to e-government services
- Expansion of government and private sector e-services
- R&D diversification and commercialization
- Promotion of PPP between science-education-industry, creation of Technology Transfer Centers
- State-of-Art ICT Infrastructure, minimization of regional digital divide
- Effective Sector Management Institutional Structure
- Direct and Indirect Financial Support Mechanisms
- Attraction of foreign and local capital to the sector
- Start-up support
- Attraction of top international large companies to local market and promotion of international cooperation in the sector
- Creation of IT clusters based on specialized segments
- Creation of competitive IT and IT-related products (industrial products, e-services) and their promotion on local and international markets
- Marketing and PR of Armenian IT brand
- Expansion of usage of ICT in other sectors of economy
- Awareness on and availability of ICT tools and applications for all layers of the society

The conception of Armenia's IT sector development was formulated on the basis of well-known modern approaches. In other words, the current achievements might lead to the improvement, optimization and acceleration of IT sector development process if sufficient mechanisms are in place.

The role of the IT industry in the overall economic competitiveness of a country has emerged as a dominant theme for the past several decades. The development of the IT sector is considered as both a highly priority and strategic necessity by the government. As IT has generally been viewed within the scope of so-called "merit goods," which means that the supply and demand of IT products may not be regulated solely by market mechanisms, state intervention is, therefore, required, mainly in the form of establishing policies and supporting the IT sector by the coordination of the sector and the provision of different incentives.

Since 2001, the government has prepared a number of government decrees devoted to the development and regulation of the innovation sector. The Armenian government's Action Plan specifically declared that while taking into consideration the increasing growth of information technologies in the international economy, the government should pay special attention to the development of the IT field in Armenia. And on May 13, 2001, the government approved its Strategy of the Development of ITC Industry, which was developed by the Armenian Ministry of Industry and Trade and based on the ICT Master Plan, prepared with substantial technical assistance from the World Bank and USAID. The global goals of the ICT Master Plan adopted on May 13, 2001 included the need to create a vibrant and sustainable IT industry.

The legal instruments developed for sector management of the innovation and IT sectors of the Armenian economy, include the June 2006 Law on State Support to Innovation Activities, the Innovation System Development Program for 2005-2010, the August 2005 Law on Electronic Communication and the December 2000 Law on Scientific and Scientific-Technical Activity. In addition, there are also several relevant state planning documents, such the Strategy on the Development of Science, the Strategy on the Privatization and Optimization of (Scientific) Research, Planning and Design Organizations, the IT Industry Development Policy, and other agreements, treaties, and legislation pertaining to the protection of intellectual property rights, public-private partnerships and international agreements, including the ratification of WIPO treaties on IPR protection, government agreements with Microsoft to promote the licensed use of any software, PPPs with Sun Microsystems, Alcatel, National Instruments, HP, among others. Armenian government has also signed bilateral agreements in IT sector cooperation with India, Egypt, and others countries.

The Armenian Law on State Support to Innovation Activities, which includes the experience, principles and approaches of other countries in the development of innovation system, is considered to be a new approach for the country in developing a knowledge-based economy. These principles became the basis for the elaboration of the Innovation System Development Program for 2005-2010, which envisages the creation of a national innovation system through the establishment and expansion of inter-related institutions in the scientific-technical and industrial-technological areas, as well as among intermediary organizations, venture and innovation funds, techno-parks, business incubators, and scientific and educational institutions engaged in technology transfer and intellectual property assessment. The main objective of this state program is to enhance the competitiveness of innovation products in the domestic and external markets and to promote the transition to sustainable economic development.

The 2005 Law on Electronic Documents and Electronic Digital Signature regulates issues related to electronic documents and the form and use of electronic digital signature. Nevertheless, the area of electronic commerce (or e-commerce) remains under-developed in Armenia. Although the main obstacle to developing electronic commerce in Armenia is the lack of legal regulation of on-line contracts, the Armenian Card (ARCA) plastic cards payment system recently implemented an important virtual cards project. Some banks introduce this instrument for clients via their websites, bank-client systems, and prepaid cards have a wide distribution (Internet cards, E-Dram, VoIP cards etc).

In addition, the 2003 Law on Public Notifications through the Internet regulates the terms and procedures of public notifications made in Armenia through the Internet in cases provided by the local legislation. The government also plans to discuss a new draft "Law on Information Technologies, Information and Information Security" in 2007.



The institutional coordination of the IT sector is handled by the Ministry of Trade and Economic Development, the IT Development Support Council (ITDSC), the Union of Information Technology Enterprises (UITE), the High-Tech Council, the Armenian Development Agency (ADA) and several other associations, as well as nearly twenty research centers and projects, including USAID (CAPS), the Enterprise Incubator Foundation (EIF), the World Bank and others involved parties.

Moreover, the sector is supported by annual DigiTech informational communication and high-tech international exhibition, yearly “IT Month” events, and ArmTech conferences. However, there is insufficient interaction among the involved bodies of the sector, including the National Academy of Science, industry, ministries, and the private sector. Yet Armenia lacks an authorized state body to serve as the coordinator of sector’s activities and development.

IV. NEW HORIZONS

As the mission of the 2001 ICT Master Plan comes to end there is an urgent need for developing a viable and proactive Master Plan to sustain and improve the condition of Armenian IT sector. The analysis of the current state of IT sector of Armenia reveals the necessity of implementing a long-term strategy aimed at developing Armenia’s IT sector competitiveness through a comprehensive approach, involving the participation of all stakeholders and use of specific mechanisms, that would result in spurring the economic development of the country as a whole.

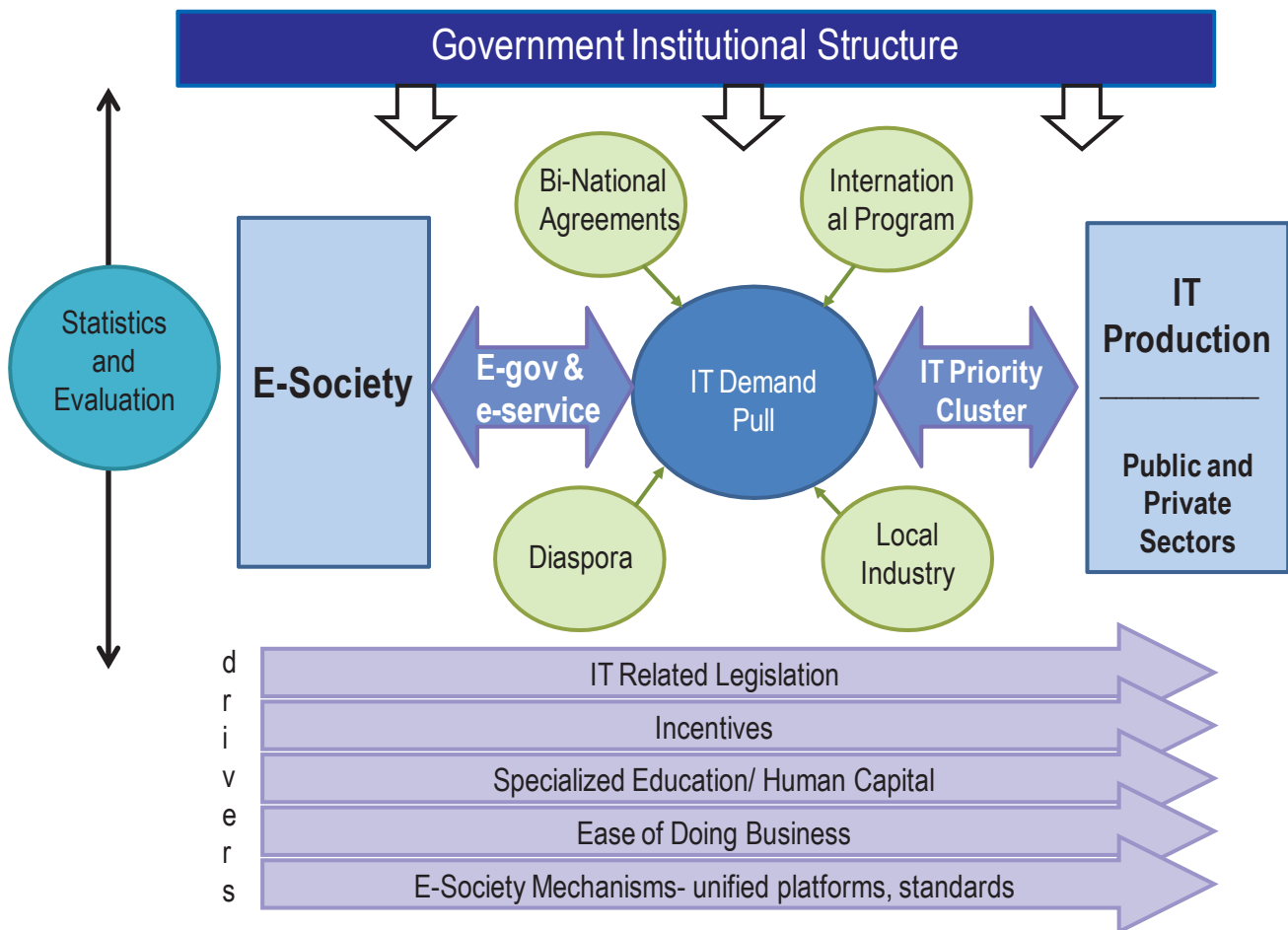
An important step in this regard is the formation of an effective organizational mechanism that would coordinate the management of the Armenian IT sector. The analysis has shown that Armenia needs more efficient policies and a better coordination of state efforts to promote IT sector development. Moreover, to attain success, the development strategies require the active involvement of the private sector.

A new strategy plan for the IT sector is to be developed in order to drive the next stage of Armenia’s IT sector development by engaging new functions and new tools to meet these goals. The successful implementation of the new strategy must be based on a more aggressive set of goal-oriented tools and policies, based on the experience of other successful countries. The new strategy must also take into account the country’s realistic capabilities, opportunities and options and remain clear, concise and easy to implement.

There are several factors to be considered prior to adopting organizational and structural steps for sector development. These factors include but are not limited to Armenia’s IT sector specifics, country peculiarities, financial constrains, and local mentality issues. The overall success of IT policy is largely defined by policy achievements and by IT penetration in the broader context of involving all related economic players, such as the industry sector, regional development, IT companies, and individual households and consumers, among others. The cooperation and alliances between the public and private sectors is more than obligatory in this sense and offers an effective measure for achieving success through forging greater cooperation among all ministries and IT sector-related bodies.

V. IT SECTOR DEVELOPMENT CONCEPTION SCENARIO

The Armenian IT sector has already entered the second generation of development. There are three major aspects to be considered for developing the IT industry. The dominant action is based on prioritizing IT industry development and accordingly concentrating on maturing a strong IT production sector. A second one is rooted in the deployment of IT for delivering government and consumer services. The third perspective defines the role of IT in expanding the use of electronic media and communication within the society. As a result of these three aspects, Armenia will be able to follow the scenario of a parallel development of the IT Sector and E-Society which will help Armenia to secure a place in the global value chain of IT production and service sector.



VI. MAIN OBJECTIVES OF DEVELOPMENT FOR IT INDUSTRY

Currently, Armenia needs active and aggressive IT-related policies that would establish Armenia as one of the leading IT countries. Armenia should aim to become the top IT producer within the Commonwealth of Independent States (CIS) in a 6-8 year period following the practices of Ireland in Europe, Israel in Middle East, and Egypt in North Africa have demonstrated. The ultimate goal for Armenia should be two-fold: to emerge as a leader among developing countries and to establish a global clearly-recognized specialized IT brand.

Ultimate Goals of the Government of Armenia are:

- To emerge as a leader among developing countries and to establish a global clearly-recognized specialized IT brand
- To emerge as a knowledge-based economy backed up by viable E-Society
- To spur economic development of the country forged by the developed IT sector and viable E-Society

Objectives:

- Develop a strong IT sector endowed with “spill-over benefits” capable of spurring increased domestic productivity
- Expand job creation and strengthening R&D capacities
- Bolster related economic growth in other sectors of the Armenian economy
- Emerge as an E-literate society backed up by full package of public and private e-services.

Implement a long-term strategy aiming at developing Armenia’s IT sector competitiveness through a multisided (comprehensive) approach involving the participation of all stakeholders and use of specific mechanisms based on the model of R&D and FDI driven strategy.

In terms of sector composition, Armenia seeks to achieve following results through implementing a holistic strategy for sector development.

| CHARACTERISTICS | 2006 | 2018 |
|---------------------------------------|-------|--------|
| Number of operating companies | 150 | 1,000 |
| Number of foreign branches | 45 | 350 |
| Techno-parks, Incubators | 3 | 30 |
| Venture funds (USD) | 0 | 1 bln |
| Industry Revenues, million USD | | |
| Total turnover | 84 | 700 |
| Domestic market | 32 | 300 |
| Exports | 52 | 400 |
| Human Resources | | |
| Total workforce | 4,156 | 40,000 |
| Technical professionals | 2,794 | 12,000 |
| Management and administrative | 1,362 | 3,500 |
| E-Society | | |
| Internet penetration | 5% | 50% |
| Computerization | 5% | 50% |
| E-government services | <1% | 60% |

VII. THE MAIN STAGES FOR IT SECTOR DEVELOPMENT AND MAIN EXPECTED RESULTS

Stage 1: Provision of basis for the development (2008-2009)

- Creation of favorable legal and institutional framework
- Formation of specialized, demand-driven IT education
- Identification of local and international IT demand and compliance of Armenian IT supply
- Reach of agreements with donors and private sector on investments

Expected results:

- Developed institutional environment
- Supply directed toward the demand
- Base of financial and human capital

Stage 2: Initiation (2009-2011)

- Development of ICT infrastructure
- Availability and access of IT services and products to the society
- Attraction of foreign and local capital to the sector
- Formation of e-government
- Promotion of e-literacy among all layers of the society
- Provision of e-services
- Involvement in international IT and R&D programs
- Commercialization of IT and R&D products
- Coordination of well-organized PPPs between education, science, and industry

Expected results:

- Well-formed e-society infrastructure, e-government, and e-services
- E-literate society
- Functioning IT infrastructure, demand-driven supply

Stage 3: Intensive Development (2011-2018)

- Penetration of e-mechanisms in all spheres of the society
- Intensive flow of foreign and local capital into the sector
- Positioning of Armenian IT brand on international IT markets and intensive promotion of Armenian products

Expected results:

- Fully equipped and developed e-society
- Internationally recognized Armenian IT brand and products



VIII. CHALLENGES AND STRATEGIC APPROACHES TO THEIR ELIMINATION: ACTIONS TO BE TAKEN

In order to forge a competitive IT sector and viable E-Society in Armenia, the following challenges should be eliminated through the implementation of the following critical “drivers” or avenues.

1. Legal Framework

Absence or deficiency of the legislation and enforcement mechanisms aimed at supporting IT sector and e-society development.

It is necessary:

- To revise, improve and elaborate the legal framework supporting the ICT sector and e-society development in Armenia, to bring it to correspondence with international standards and ensure efficient enforcement of the legislation, particularly in the area of policy implementation.
 - Elaborate the legislation regulating E-commerce and E-governance,
 - Draft the legislation to promote and develop commercialization of innovative R&D products (R&D law),
 - Develop mechanisms to ensure effective implementation of legislation pertaining to IPR
- Revise, improve and elaborate the diversified policy on professional training of IT specialists in order to advance the development of ICT sector.
- Development of effective and applicable mechanisms and projects to ensure enforcement of the legislation on protection of the intellectual property rights over IT products.

Outputs:

- The regulated e-society will promote and develop PPPs and will result in private sector investments and formation of e-society.
- Development of the R&D sector will form the demand for IT products.
- The mechanisms of securing the copyright of IT products will promote the growth of IT and R&D results and will make Armenia a more attractive market for consumption and production of IT for foreign IT producers.

2. Economic and Business Environment

Lack of supportive economic and business environment for expansion of IT sector activities and wide-spread use of IT instruments.

It is necessary to accomplish the following tasks:

- Regular presentation and promotion of Armenian IT products on the Digitech international expo of information, communication and advanced technologies;
- Armtech forum should be used as a forum for the discussion of future trends of e-society and IT sector development as well as problems to be addressed by the next generation;
- Creation of complete statistical, reporting system on the ICT sector;

- Development of mechanisms and implementation of appropriate measures to support business activity; introduction of “one-stop-shop” idea as a general portal of services offered by state authorities;
- Modernization of import and sales of tools and products related to the IT sector, training of specialists from respective agencies (particularly, certification, customs and tax authorities), technological modernization, and reduction of control and oversight.

Outputs:

- Growth of local start-up IT enterprises and those operating with foreign investment,
- Developed IT imports and exports.

3. IT Sector Management Policy

Lack of policy on centralized and institutional management of IT sector and its infrastructures and targeted development of the sector.

It is necessary:

- To ensure that respective institutional structures are in place to engage into following activities: perform analysis of IT sector development directions and provide appropriate recommendations, prepare regular reports on the status of IT sector, identify criteria for the decision making and application of various financial, tax and other incentives for local IT companies and foreign investors, creation of free economic zones taking into account the targeted IT directions, the current demand, the geographical position and other pre-conditions (large cities, R&D centers and universities), oversight over the entry of companies to these zones based on pre-determined criteria, use of incentives to promote demand for local IT companies with respect to the local R&D results, management of grant and venture (state and private) funds, credits and other investments.
- Creation of an agency to promote the development and export of IT products,
- Establishment of centers for the control and certification (CMMI) of IT products in compliance with internationally accepted business processes and quality control,
- Establishment of a professional IT consulting and managing agency,* which will involve both public and private sector representatives and will contribute to targeted implementation of the IT sector policy and effective guidance of investments,
- Selection of target sub-areas based on the assessment of effectiveness of IT sub-areas; identification of local and international demand for a more focused approach and specialization in the future,
- Identification of target countries , especially in Europe, of IT demand and establishment of a network of Armenian IT sector representatives in these countries,
- Specialization of the IT sector in the areas of computer equipment production, advanced technologies and complex engineering solutions and systems,
- Review of internal and external demand for IT services, administration of the demand database, and delivery of contracts to the Armenian IT producers based on the demand information.



Outputs:

- The functional coordination will provide for more effective management of the sector including its transparency, awareness, targeted direction and use of resources and incentives, consistency between supply and demand.

*A body similar to Office of Chief Scientists, which will analyze and suggest prioritized IT development directions and periodically reports on state of IT sector; establishes the criterion for financial, fiscal, and other incentives to local IT firms and foreign investors; will define the free zones on the basis of prioritized clusters, geographical location (cities, R&D institutions, universities) and controls the entrance of firms into defined free zones based on the established criterion; will provide local industry with incentives for R&D demand generation for local IT firms and manages the public venture funds.

4. Clustering through Sector Segmentation and Prioritization

- Based on thorough analysis of the existing IT production sector and potential demand identify 3-5 priority IT production segments, which would be targeted as the primary areas for attracting capital, providing specialized education, and generating exports. These segments might in future initiate the creation of IT clusters targeted at increasing the effectiveness of the sector.
- Sector specialization in hardware, high-tech, and complex technical solutions and systems
- Identification of local and international IT demand and supply of local IT products to domestic and international markets in accordance with the local and international IT demand.

5. Professional Education

Deficiency of the professional education in the area of IT, inefficiency of management mechanisms within the companies, uncompetitive labor costs in the IT sector, low productivity rate.

It is necessary:

- To adjust the teaching curricula of educational institutions preparing IT sector specialists to international standards and market demand,
- To support the IT sector educational institutions with modern technologies and materials,
- To support professional development of RA Army recruits from the IT sector in order to preserve their professional skills,
- Encourage the training of lecturers from IT sector and involvement of young specialists into the institutions of higher education,
- To create an internationally competitive business school which will supply young managers and successful entrepreneurs to the IT sector,
- Encourage private investments into the system of professional educational in IT sector,
- Develop mechanisms of assessing the quality of IT education by contractors/beneficiaries and guide the flow of financial resources to the educational system based on those assessments.
- Development and implementation of mechanisms for increasing workforce productivity in IT sector.

Outputs:

- Educated IT workforce and IT sector managers that meet the current demand.

6. Public Private Partnerships

Slow development of partnerships and collaboration between education, science and industry due to insufficient cooperation between private and public sector IT entities.

It is necessary:

- To develop mechanisms to improve the effectiveness of cooperation between the private sector and higher education institutions this is aimed at encouraging the modernization and update of educational programs through the involvement of private sector and large international companies,
- To carry out measures aimed at encouraging the cooperation between the economy, science and educational sectors, elaborate and implement policy targeted at improving collaboration between R&D and the IT industry. More specifically, it is necessary to create:
 - R&D centers and incubators,
 - Technoparks (including large IT enterprises, educational and R&D centers, which will create favorable conditions for start-up enterprises and SMEs),
 - Technology transfer centers,
 - IT village equipped with special economic, technological and infrastructure conditions (Smart Village),
- Create appropriate mechanisms to provide grant funding to the R&D projects and activities initially with private and public sponsorship and in the future with private support.
- Establishment of and fundraising for a “publicly-capitalized” but privately-managed equity/venture capital fund (\$50-100 mln), which will promote Armenian high-tech and other private sector business development and policies, practices and institutions conducive to such private sector growth. The venture capital should be especially directed toward innovative technology companies and SMEs, including successful R&D projects with the aim to transform those into start-up companies, SMEs),

Outputs:

- Developed scientific and educational system, commercialization of IT products, enhancement of competitiveness of IT products, growth in the number of IT and R&D enterprises.

7. International Cooperation

Inadequacy of international and bi-lateral agreements and programs, low level of demand for Armenian IT products, the need to accede to international organizations.

It is necessary to implement the following activities:

- To increase awareness among foreign investors and businesses about Armenia and Armenian IT products using the potential of Diaspora,
- To create Armenian IT representations in the world’s major IT markets using the capacities of Armenian foreign embassies for the promotion of Armenia-made IT products,
- To support implementation of joint programs and agreements with strategically important countries that achieved noted success in the area of IT, to participate in the regional and international R&D projects,

- To accede to international IT organizations and conventions to ensure correspondence to international standards and increase competitiveness of local IT products,
- Increase the volume of local and foreign investments in the area of IT and encourage involvement of world's largest companies in the country's economy.

Outputs:

- Directed demand for IT products towards the Armenian market, participation of modern Armenian IT and R&D enterprises in the development of modern technologies,
- Promotion of the Armenian IT product and brands on the international market.

8. Financial Incentives

Limited financing to IT sector, lack of venture capital, lack of special direct and indirect incentives to encourage the productivity of related R&D and IT areas, lack of targeted use of direct investments to promote expansion of local production in the area of IT.

It is necessary:

- To provide special direct and indirect financial incentives to the IT sector directed to the development of small and medium enterprises, expansion of local production in the area of IT in order to attract foreign investment,
- Development of mechanisms directed to the creation of business angel networks using the potential of the Armenian Diaspora, to encourage participation of local foreign business angels in the sector,
- Initiate creation of commercial investment bank for IT sector financing, development of the capital market of IT enterprise,
- To develop venture funding mechanisms, to establish venture funds based on the cooperation of private and public sectors in order to support start-up enterprises,
- Encourage application of information technologies and IT tools in other branches of the country's economy, build awareness of its importance and effectiveness.

Outputs:

- Development of start-up IT enterprises, use of Diaspora resources, modernization of other branches of the economy.

9. Electronic Communication

Underdeveloped infrastructure and disproportional development within the region, existence of a "digital gap", low level of internet accessibility, existence of incompatible and insecure platforms.

It is necessary:

- To organize the unified electronic communication network on the territory of Armenia to be used by the state, public and private sectors,
- Carry out research of existing infrastructure for more effective selection of the future unified platforms,
- To modernize and equip the present electronic communication infrastructure,

- To ensure the affordability and accessibility of Internet connectivity by granting incentives to the private service providers,
- To ensure affordability and accessibility of electronic communications network and Internet connection on the territory of Armenia, to reduce the regional gap with respect to the development and use of ICT,
- To create Internet access points in rural communities of the country,
- To ensure security of ICT infrastructures by using international experience and standards,
- To develop wireless Internet in the urban areas of Armenia through PPPs,
- Encourage purchase of new computers by granting appropriate incentives (for example, refund of VAT to citizens buying computers),
- To initiate private sector-oriented legislative improvements and targeted support aimed at developing and offering publicly available, competitive universal communication services.

Outputs:

- Strategic and comprehensive framework for the development of e-society in the country, enhancement of the public participation and interest towards E-society, formation of the local IT demand, reduction of the region's uneven digital development.

10. E-Government

Existence of inadequate E-government mechanisms that do not meet the current demand.

It is necessary:

- To develop mechanisms regulating formation of e-government,
- To select compatible unified platform of e-government and to create a unified network between the state agencies,
- Training of government officials and other officers involved in the elaboration of a policy on IT and IT-related sectors,
- To modernize working processes in state agencies through the application of ICT technologies, to expand the use of ICT tools.
- To ensure participation of public and private sectors in the e-government development processes, identify the demand for the state e-services, to involve the private sector in the creation of e-government,
- To secure participation of the private and public sectors in the elaboration and transparent implementation of the policy pursued by the government in the area of IT,
- To expand the network of e-services provided by the government (electronic reports, e-Tax, e-Customs, etc).

Outputs:

- Transparent state policy, effective governance, convenience of e-services provided by the state authorities, reduction of bureaucracy.

11. Spin-off effect

The IT development of other branches of the economy and low level of application of IT tools in other branches of economy.

It is necessary:

- To encourage the application of IT and R&D results in other sectors of the economy, particularly among small and medium-size enterprises, and to increase the awareness about their importance and effectiveness, thus strengthening the local IT industry and increasing the competitiveness of other sectors of economy.
- To use the skills and knowledge of students and specialists of the IT sector recruited to the Armenian Army which will help in the technical upgrading of the Army.

Outputs:

- Formed additional demand for IT, increased effectiveness of other sectors of economy through IT improvements,
- The IT development in the Armenian Army.

12. E-Society

Lack of coordinated program for e-society development, low level of public awareness and e-literacy.

It is necessary:

- Implementation of measures aimed at increasing the e-literacy of the society, such as introduction of e-education in the school curriculum and appropriate disciplines in all departments of universities and institutes, organization of training programs in workplaces and related public centers for the population.
- To ensure the accessibility of diverse services delivered to the population via electronic means such as e-education, e-public health, e-commerce, e-payments, and e-transactions, by using the private sector potential in this area.
- To elaborate and implement e-governance development programs for the country.
- To create a unified platform and infrastructure for electronic identification of physical and legal entities (Public Key Infrastructure, PKI) by designing personal “electronic keys” for the use of e-services (e-government tools, e-commerce and so on) within e-society,
- To create a network of schools and/or other public institutions on the territory of Armenia in collaboration with international donor organizations and private sector entities and based on that upgrade the level of e-literacy among the larger public and create opportunities for information exchange.

Outputs:

- Formation of the society’s demand for IT and promotion of a supply of e-services.

13. IT Products Promotion, Marketing, and Commercialization

Unrecognized Armenian IT brand.

It is necessary:

- Identify implementation mechanisms and corresponding bodies for promoting Armenian IT products in international arena; develop IT promotion body representation in key IT markets; develop a strategy for diaspora involvement in IT products promotion and commercialization.

Outputs:

- Internationally recognized Armenian IT products and regionally and internationally well-positioned Armenian IT brand.

IX. ACTION-BASED PROGRAMS FOR SECTOR DEVELOPMENT

IT sector development actions must be based on the following components:

- A program to (a) create a proactive institutional, policy, and regulatory environment that is supportive of IT sector development and promotion of R&D activities (including law on R&D, Office of Chief IT and R&D Scientists, institutional structure of IT-related government bodies); (b) enhance the knowledge on IT sector and E-Society capacity among senior government officials and other key stakeholders involved in the implementation of IT-related policies and promotion of E-Society; (c) identify the key bodies and their corresponding responsibilities and interrelation among each other and private sector in policy implementation; (d) creation of effective public-private partnerships to facilitate the formation of venture funds, incubators, techno-parks, and technology transfer centers; (e) communicate these initiatives and policies to the wider stakeholder audience and facilitate partnerships around developing E-Society in Armenia.
- Develop an IT Education and Industry Promotion Program with the following principal objectives: (a) to upgrade Armenia's IT capabilities, competitiveness, and revenues by improving the quality of its managers and professionals through assuring appropriate educational institutions such as a competitive Business School creation; (b) to develop a multi-layered and multi-skilled IT workforce through assurance of life-long vocational and practical education which will aim to increase the employment in the sector; (c) to create collaboration between universities-industry-IT sector through the establishment of technology transfer centers and cooperation among corresponding institutions for commercialization of R&D products; (d) to improve the effectiveness of local industry, especially small and medium enterprises (SMEs), through the use of IT and R&D products and services in all sectors of the economy; (e) introduction of e-one-stop-shop for business operations.
- A strategic program aiming at attracting international demand, funds, joint R&D projects, and skilled educational workforce to Armenia's IT sector (reverse brain drain); a proactive strategy aiming at providing the basis for the world leading IT and R&D companies to cooperate with local private sector and attracting foreign capital into IT sector in the form of risk capital. Ratification and creation of international agreements for joint projects and knowledge sharing.

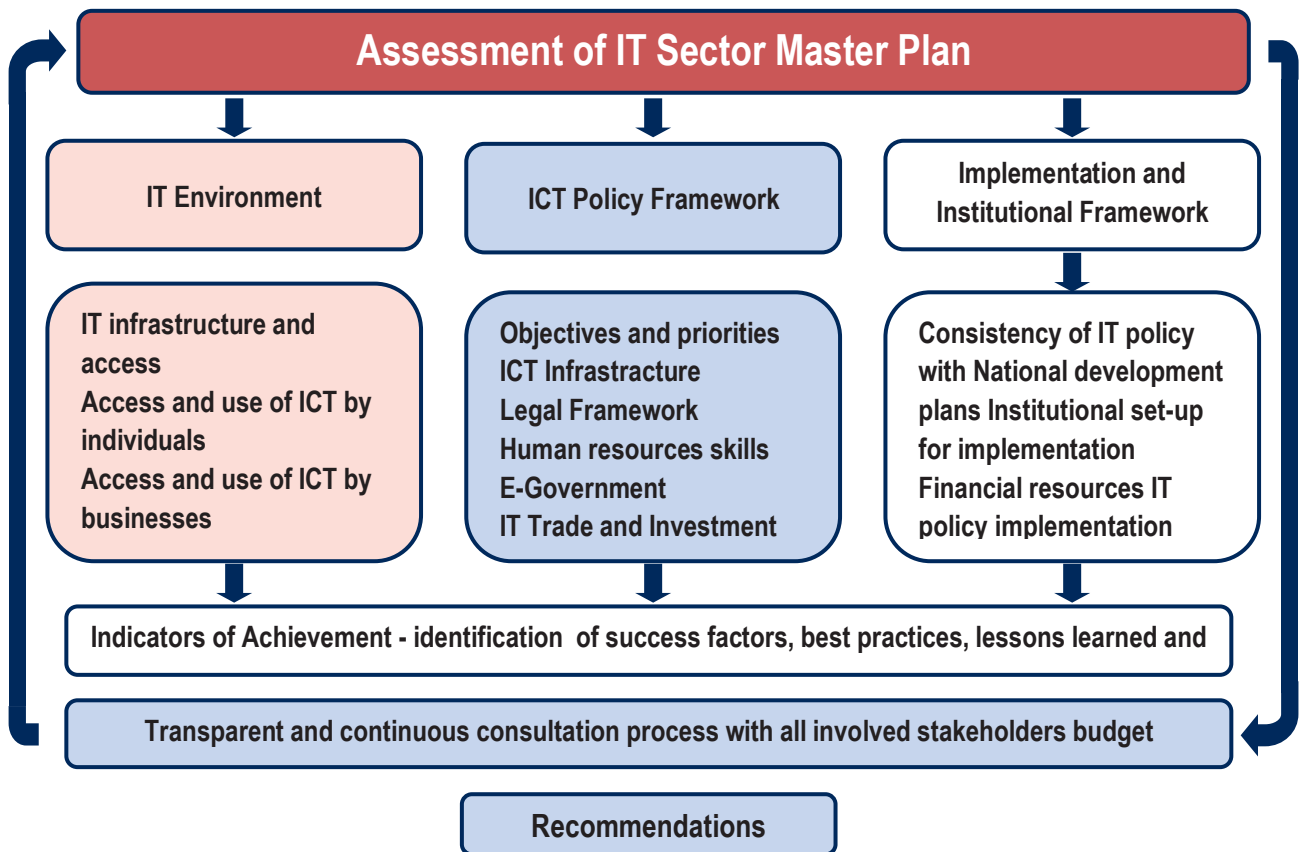
- A program aimed at creating a strong IT infrastructure through (a) increasing the internet penetration in the country, empowering the population in rural areas of Armenia through affordable community access to information and communication technologies; (b) demand driven infrastructure for start-up support, such as incubators, techno-parks, and free-zones; (c) development of unified platforms for information sharing.
- A thorough research and analysis initiative to create financial and fiscal policies that would identify the effective measures to be taken to provide the sector segments with justified tax and investment incentives that would lead to the IT sector increased profitability and growth in R&D activities. The creation of financial mechanisms such as venture funds and business angel networks for supporting start-up IT companies, grants and tax loans for R&D initiatives. The possible creation of special economic (free) zones targeting IT sector companies.
- A program to upgrade the quality of Armenian IT products through defining production standards to develop Armenian IT product branding on local and international markets and to promote R&D products with potential commercialization.
- A later stage E-Society program encompassing the previous achievements with the goal to promote the innovative use of IT to meet economic and social needs of the most vulnerable segments in Armenia; to develop approaches to scale up successful applications; and to empower civil society with affordable access to information, communication, and relevant local content.

X. MONITORING AND EVALUATION MECHANISMS

For the development of the Armenian IT sector, there is an essential need to formulate and implement a consistent and continuing monitoring and evaluation mechanism capable of ensuring IT sector empowerment. Moreover, such a continuous monitoring and evaluation mechanism must be in place for all stages of strategic development and implementation, and as a core component of IT policy.

Monitoring and evaluation (M&E) activities are also applied to addressing the priorities and goals set forth in the Strategy, serving to evaluate the efficacy of proposed measures. Given the complexity of the scope of IT policy implementation, which generally covers a period of between five and ten years, the process of policy implementation and its evaluation requires the active involvement of all relevant stakeholders, in all stages. The set of policy evaluation tools should also be centered on monitoring the policy goals, strategic priorities, key initiatives and specific measures set forth in the IT Master Plan.

Therefore, the availability of well-designed monitoring and evaluation mechanisms will enable both stakeholders and decision-makers alike to timely diagnose possible deviations from the major goals and priorities, thus enabling the identification of possible steps to improve the quality of proposed measures during the implementation process. Moreover, effective monitoring and evaluation mechanisms within benchmark countries have tended to concentrate on a definition of clear procedures for M&E, the identification of specific indices, the establishment of a reasonable time frame, and the creation of budgetary mechanisms.



The success of IT policy is largely defined by policy achievements and IT penetration in the broader context of all related economic players, such as the industry sector, IT companies, and households, for example. The cooperation and alliance between the public and private sectors is more than obligatory in this sense and offers one effective measure for achieving success through forging cooperation among all ministries and bodies. The government should also concentrate on involving the State Statistical Agency and relevant ministries to provide data in order to:

- Measure the success of formulation and implementation of IT policy
- Identify the metrics to measure the effectiveness of policies
- Establish links between IT policy and performance of related sectors
- Monitor IT growth and use over time
- Analyze the impact of IT policy on productivity, growth, enterprise development, trade and human capital development

Monitoring Milestones

These narrower metrics among others should be considered for measuring the effectiveness of the IT policy from all aspects throughout the larger process, looking at each component of Armenia's progress:

- Number of companies in specialized IT segments
- Number of graduates with education in specialized IT segments
- Level of IT specialists repatriation
- Growth of FDI to IT sector
- IT sector output by segments
- IT sector employment rate
- Share of IT products in total exports
- Share of IT in GDP
- Number of bilateral and international agreements in IT cooperation and collaboration
- University R&D financed by private entities
- Early-stage venture capital, total venture capital
- Innovation related laws effect appreciation and evaluation
- Attracted foreign R&D and IT programs
- Number of R&D and educational expenditures of private sector companies
- Public and Business R&D expenditures
- Share of medium & high-tech R&D
- Share of firms receiving public funding
- Quality of e-operations and expenditures of key state bodies for E-society
- Attraction of foreign R&D and IT programs for E-Society development
- Access to e-services and availability of overall online services
- Number of Internet users
- Number of government agencies online
- Internet access in public and private institutions
- Average time for completing transactions online

XI. REFERENCES

The Concept Paper has been developed based on preliminary documents and presentations prepared by Global SPC that were presented and approved by USAID/CAPS, the Working Group on IT Sector Strategy Development and Ministry of Trade and Economic Development.

The following studies on IT sector and E-Society in Armenia produced by both the private sector, public sector, and international organizations have been used for developing the justification of the IT Sector Action Plan:

USAID/CAPS IT STRATEGIC ACTION PLAN,

Benchmarking of Armenian IT Policies from the Perspective of Increasing IT Cluster Competitiveness – Global SPC/CAPS

Armenian IT Industry Growth Model – Enterprise Incubator Foundation

Key Levers for Productivity Improvement and Software and IT Services Sector Potential- McKinsey & Company

Republic of Armenia ICT Assessment Report- SETA Innovative Enterprise Solutions

Armenian Information Technology Sector Software and Services; Report on the State of the Industry- Enterprise Incubator Foundation

Development of Armenian E-Government National Strategy- Investment Promotion Council, France

Reports, Studies, and Data by CAPS