



UNITED NATIONS DEVELOPMENT PROGRAMME

e-Readiness Assessment of Uzbekistan

Final Report

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Project Scope

The United Nations Development Program has initiated a major global effort to promote information and communications technologies (ICT) in support of national development. The UNDP's Country Office in Uzbekistan has identified ICT as one of the priority areas for the UNDP's specific interventions in the country. The *Human Resource Development for Change* (HRDC) program, co-hosted by the State Committee for Science and Technology, was designed to accelerate adoptions and usage of ICT in Uzbekistan through research and analysis, pilot interventions and policy advice.

An early undertaking of the HRDC program, agreed in March 2001, is to complete an "e-readiness" assessment of Uzbekistan. The goals of this study are to:

1. Create a research basis, or policy 'mirror,' for decision makers that reflects the level of ICT development in the country;
2. Build an ongoing ICT statistical monitoring system that will be established within the program; and,
3. Provide preliminary policy recommendations to help modernize the ICT sector in Uzbekistan.

This final report is a first stage analysis of ICT use and deployment in Uzbekistan. Its objective is to detail existing policies, activities, and the current level of ICT infrastructure and to describe the penetration of ICT in government, legislative policy, economy, education and society at large. It is meant to raise consciousness regarding the overall status of ICT development, build consensus among stakeholders, and stimulate policy discussion. The specific tasks examined by the domestic e-readiness study team, led by a consultant from Network Dynamics Associates (New York), are to identify:

- a) Uzbekistan's strengths and weaknesses in its transition to an information economy;
- b) Government policy options for a national ICT strategy; and,
- c) Immediate tasks required reduce obstacles and potential risks for successful implementation of an ICT Development Strategy.

Methodology

This E-Readiness Assessment of Uzbekistan is based on *Readiness for the Networked World: A Guide for Developing Countries* created by the Center for International Development at Harvard University. The Guide is an academic policy discussion tool that helps outline a wide range of considerations. The Guide is meant as a general framework that national communities can tailor to address unique local development needs. It does not draw comparisons among communities but is designed to stimulate internal appraisal. In this regard, the Harvard Guide does not offer any comparative benchmarks with peer economies such as the *Information Society Index* (ISI) prepared by International Data Corporation (IDC)

and *World Times* or the Economic Intelligence Unit's *E-Readiness Ranking*. Our study examines the state of e-readiness in five basic groups of categories: Infrastructure, Policy and Legislation, Education, Economy and Government, and Society.

In order to adjust the Harvard's Guide to better reflect the situation and peculiarities in Uzbekistan, first, we amended it with data indicators drawn from the Asia Pacific Economic Cooperation (APEC) *E-Commerce Readiness Guide* and from the International Telecommunications Union (ITU). We further aligned the data with basic inputs utilized by IDC's *ISI* in order to enable future comparisons with other societies.

Further, we developed a weight coefficient method to assess the stages of development in a more precise way. The weight coefficient takes on the value from zero to one, according to its stage of the development. The weights assigned to the Harvard's stages are as follows:

- 1 stage – from 0 to 0,25
- 2 stage – from 0,25-0,5
- 3 stage – from 0,5-0,75
- 4 stage – from 0,75-1

By assigning the weight coefficient to a certain component of the area, we hoped to create a basis for future detailed monitoring of ICT development and progress in the country. It also enabled us to represent the data in a convenient graphical way.

The study was completed in four weeks in July 2001. A total of 19 local experts were organized into five study groups of local experts and led by the international consultant (Network Dynamics). Altogether the experts measured a total of 23 categories consisting of more than 231 individual indicators within these categories. For each category we assigned a value of between 1 to 4 to coincide with the stages of development specified by the Harvard measurement methodology. Average scores were created to reflect the stage for each category. The stages can be briefly summarized as follows:

- Stage 1** is the lowest stage of development. It is characterized by a very low level of infrastructure development and telecommunications services, limited and unaffordable Internet access rates, absence of registered domain names and low level of public awareness.
- Stage 2** is characterized by underdeveloped ICT infrastructure, limited number of Internet users and a few registered domain names. At this stage faxes and telephones are the most usual means used at work. Some local businesses operate websites. Only a few people use computers at work.
- Stage 3** evidences public awareness of the Internet but only 10 % of the population or fewer use it on a regular basis. Many organizations are equipped with computers connected through LANs; some employees use ICTs and Internet

resources extensively to do their jobs and email is commonly used for private purposes.

Stage 4 is characterized by the efficient work of fully liberalized ICT sector, high level of awareness and wide usage of ICT technologies by the population, including for B2B and B2C online for shopping, exchange, trade, etc. Business transactions occur online over automated, fully integrated systems.

For more information about the Guide, see: www.readinessguide.org.

Whenever possible, data was collected from appropriate official sources in the government, including the State Committee for Science and Technology, Uzbek Agency for Post and Telecommunications (UZAP), UzbekTelecom, UzPak, Ministry of Higher Education, The Bar Association of Uzbekistan, Ministry for Higher Education, as well as international and domestic organizations such as UNDP, The World Bank, Commerz Bank, Eurasia Technology Group (Tashkent), and the Global Internet Policy Initiative. There is no centralized repository for information about the ICT sector in Uzbekistan. As a result, data was often difficult to obtain and many figures are contradictory. While this study attempts to normalize the data, significant gaps remain.

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1.0 Executive Summary

If we want to present ourselves as ready for the 21st century, to live by modern technologies, to live by informational technologies, we have to implement the Internet.

-- President I.A.Karimov

In May 2001 the Government of the Republic of Uzbekistan, led by President I.A.Karimov, officially launched the Internet era in Uzbekistan. In a wide-ranging vision statement, the President challenged his government to develop a strategy to accelerate the adoption and dissemination of information and communications technologies (ICT) technologies in support the social, cultural and economic future of the nation.

The President's initiative signals a major strategic shift. The government now firmly recognizes the importance of embracing ICT to achieve its development goals. Stimulating economic growth, raising living standards and modernizing cultural activity will be greatly facilitated with the introduction of an advanced information infrastructure and widespread introduction of ICT into everyday life.

Embracing ICT to supplement the dominant agricultural economy is a huge undertaking. It requires widespread reeducation and training; a transformation of the public telecommunications network; proactive legislative policies; investments in new hardware, software and integration services; a determined mass media campaign to raise public awareness -- and considerable political will. By its very nature, ICT also implies adopting an entirely new approach to information policy. To ensure that the people of Uzbekistan can participate fully in the worldwide Internet revolution, it is essential to promote pervasive access to networks and information databases both within the Republic and to resources abroad. As has been demonstrated in countries around the world, genuine commitment to the *free flow of information* in society speeds the transition to a market economy and dramatically improves social welfare.¹

The Government can play a prominent and powerful role in stimulating ICT development in Uzbekistan. The prominence of the state sector in the economy suggests that effective reform will begin with the government itself adopting ICT to promote efficiency and transparency. A commitment to "e-government" -- to put government agencies online, and to ensure seamless electronic communications between the public sector and the people -- is the most convincing demonstration that the Republic is serious about welcoming the Information Age.

¹ Analysis from the NGO Freedom House demonstrates that economic growth in countries with open access to information is nearly 2.5 times as fast than in countries with significant restrictions on information flow. (Source: <http://www.freedomhouse.org/research/freeworld/2001/growth.htm>.)

The government can also set the overall vision for ICT development by establishing an *enabling environment* for ICT calculated to encourage market innovation and private investment. Global experience clearly shows that ICT adoption expands at a furious pace when artificial obstacles to growth are eliminated through progressive legislation and policy reform. At the same time, the Government can stimulate overall adoption of ICT modernization by dramatically increasing direct state spending on ICT in the near term. Leadership from the state will help ensure that ICT becomes a primary engine for economic growth and will encourage equitable development in all regions in the Republic. Dedication to an aggressive ICT strategy will also improve Uzbekistan's opportunity to increase direct foreign investment in all sectors of the economy.

As in many countries, Uzbekistan is embarking on its transformation to an information society with uneven resources. There is a wide disparity between the urban capital and the rural countryside in ICT adoption rates, market opportunity and end-user sophistication. For example, a resident of Tashkent is fourteen times more likely to have a telephone than a citizen in the rural countryside. The vast majority of mobile phone users also reside in the cities. While there are approximately 140,000 Internet users in the country today, an estimated 95% of Internet users are in Tashkent.² Internet penetration is expected to reach approximately 1% of the population by year-end 2001. Only four of the Republic's 45 Internet Service Providers (ISP) are located outside of the capital.³ Few entrepreneurs in the ICT sector see the economic benefit of making investments in the regions and prefer instead to concentrate their activities where commercial opportunity is strongest.

The so-called *Digital Divide* is a global phenomenon. Every country can be said to have wide variance between those members of society who are 'information-haves' and those who are 'information have-nots.' Rapid introduction of ICT holds the promise of narrowing the divide by promoting equal access to information and information resources. ICT can also widen the divide between social groups, as the well-educated urban vanguard characteristically adopts ICT most quickly. Urban users are generally more likely to apply ICT in a pragmatic fashion in support of commercial activity. The expense associated with ICT – from advanced public networks to computers, software and advanced technology integration and management skills – virtually ensures that the rate of dispersion within society will be uneven.

As the Government articulates a policy environment for ICT, it will need to determine how it will address the digital divide. Should a leading community be encouraged to speed ahead in ICT to lead the nation? To what extent should the state intervene with an 'e-society' initiative to equalize opportunity and promote ICT as a public utility? Is the pace and diffusion of ICT best encouraged by promoting living standards? Can the Government 'prime the pump' for ICT by creating conditions that stimulate market demand? Formulation of answers to these and related questions will help inform the scope and pace of policies required to liberalize markets, encourage private investment, and raise educational preparedness for ICT.

² Eurasia Technology Group estimates.

³ Source: UZAP

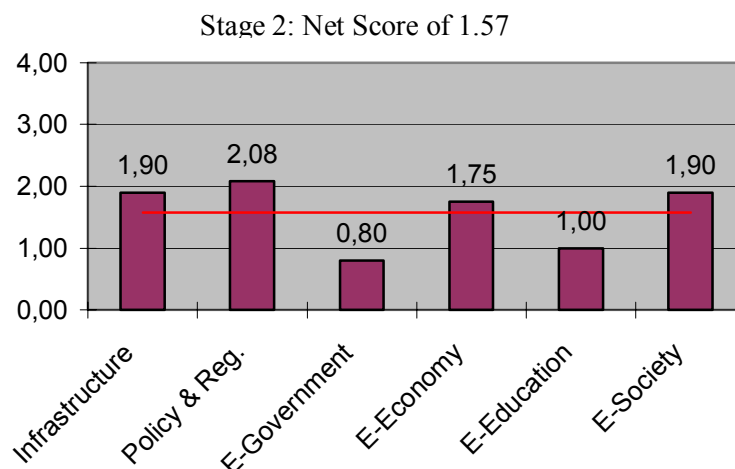
Most critically, as policy makers debate the direction for ICT development in Uzbekistan, there can be no ambiguity concerning the foundation that needs to be laid for the future. *Widespread adoption of the Internet and of ICT in Uzbek society, in accordance with the President’s vision, is only possible if telecommunications network services and information databases are abundant, inexpensive, and readily accessible.* To achieve this objective, a regulatory and policy environment for ICT needs be articulated that encourages private investment, promotes competition, and lowers real service costs to the people of Republic.

1.1 E-Readiness Summary

Based on statistical and interpretive application of the Harvard’s *Readiness Guide*, our research shows that Uzbekistan is at Stage 2 in e-readiness on a scale of 1-to-4. The average analytical score overall is 1.56. At this level, a society can be said to be just embarking on the adoption phase of the ICT revolution. Access to telecommunications infrastructure is concentrated heavily in major urban areas, and overall telephone density is between 2 and 8 telephones per 100 people. Internet services are offered through a number of providers, but access is primarily via low-speed dial-up modems. Overall usage of ICT in the daily life of the people is low, with negligible usage of ICT in schools, government and commerce. Market regulation is dominated by the state and competition for is extremely limited.

For the most important indicator – Infrastructure – Uzbekistan is mid-way between Stage 1 and Stage 2 with an overall rating of 1.57. Improvement is absolutely essential for the wider social impact of ICT to take hold. All “softer” indicators that measure how ICT solutions are disseminated throughout the nation – e-government, e-education, e-economy, and so on – are heavily dependent on the establishment of a robust physical network infrastructure. Aggressive improvements are urgently required.

Figure 1. Total E-Readiness Indicator for Uzbekistan



Uzbekistan is effectively at Stage 2 in the important areas of Infrastructure and Policy and Regulation, but trails in the current state of modernization of the government, economy and education.

1.2 E-readiness Strengths, Weaknesses, Opportunities, Threats

The global economy has fostered a new dimension of competition among nations: competition for skilled ICT human resources. As nations strive to modernize in line with the global ICT revolution, a new premium is placed on a society's ability to train workers in ICT, pay competitive salaries, and promote social standards that attract and retain the most qualified professionals. Intellectual capital has become the highest measure of value in the information society. Given the strong global demand for qualified labor, workers with ICT experience are highly mobile and routinely seek opportunities in geographies that reward their efforts. To compete in this environment, Uzbekistan will need to become a 'center of excellence' in ICT to rival or exceed the capability of its neighbors. The national development strategy for ICT must thus not only prepare the economy and society for ICT; it must also prepare Uzbekistan for the world.

The following "SWOT" analysis summarizes some of the key strengths, weaknesses, opportunities and threats that Uzbekistan faces in its transformation to ICT.

Strengths

Uzbekistan is entering its period of rapid ICT modernization with a number of positive assets that can help facilitate the new strategic emphasis on ICT and information services. The dominant theme among these capabilities is the depth of human resources available to be committed to ensure success:

- Vision and political will to support ICT
- Highly educated workforce
- High literacy rate
- Skilled technicians trained according to international commercial standards
- Resourceful software programmers
- Reasonable international telecommunications capacity.

Weaknesses

Uzbekistan is a newcomer to advanced ICT practices. It lacks many of the fundamental attributes that will be required over time to be considered "ready" for an information society. The greatest weakness is infrastructure. Today Uzbekistan lacks low-cost and ubiquitous telecommunications services and these services are absolutely intrinsic to widespread adoption of the Internet. Similarly, the current regulatory climate for the ICT sector is not adequate for ensuring that the required investments in infrastructure can be made.

- High cost and availability of telecommunications bandwidth
- Limited competition for basic network services
- Insufficient domestic data network capability
- Confusing Internet and ISP policy

- Low PC penetration and low purchasing power for acquisition of advanced ICT technologies
- Low adoption and usage of ICT in government
- No currency convertibility
- Absence of electronic payment systems for e-commerce, including bank cards
- “Doubly landlocked” geographic position
- Negligible ICT manufacturing capability

Opportunities

Given this preliminary assessment, what are Uzbekistan’s greatest strengths for ICT? How can its policy focus and investment resources be most economically directed? Which ICT vision can become reality?

Clearly, Uzbekistan’s greatest strengths lie in its people. The Republic has excellent human resources that can be directed in cohesive development programs that support a national mission. India, for example, has demonstrated how a proactive government policy can successfully promote a software industry to the highest global standard in a very short period of time. Singapore, a country with few natural resources, aggressively developed an ICT industry through careful planning. Korea became a leader in next-generation mobile technologies based on the results of internal technology policy analysis.

Possible services sectors that could be appropriate for Uzbekistan include:

- Software development
- Software integration services
- Database integration
- Other services-based businesses to be defined.

Developing a local ICT manufacturing capability in parallel with a services sector requires careful assessment. The global ICT hardware market changes quickly; currently there is extreme downward pricing pressure on many products in the global markets. As a doubly landlocked country, Uzbekistan has high raw material and transport costs and lacks a production supply chain for high-tech manufacturing. Domestic manufacturing can alleviate some pricing pressures that currently hinder achieving basic ICT literacy. Selection of the sectors to be supported should be made only after comprehensive analysis of domestic capabilities and worldwide market conditions. Uzbekistan’s computer peripherals industry is well developed and might be augmented, or repositioned, to boost exports.

Success in launching creative new ICT industries in Uzbekistan will depend on retaining gifted professionals. Today, unfortunately more than fifty percent of ICT workers trained to international standards emigrate to USA, Germany, Russia and Kazakhstan. Local salaries will need to be increased, particularly for employees dedicated to the important task of modernizing the ICT capability of the government. Small entrepreneurial companies that will drive ICT adoption in Uzbekistan -- and engage the imagination of the country’s best and brightest minds -- need to be supported with proactive taxation and other incentives.

Finally, for Uzbekistan to capitalize on its strengths, a dramatic upgrade in telecommunications and Internet capacity is required. To be a credible contender on the world stage – or even on the regional Central Asian stage – open access to abundant and inexpensive telecommunications services is absolutely essential. A policy regime needs to be defined and supported that encourages private investment, promotes competition, and lowers real service costs to the people of Republic.

Threats

The greatest potential threat to Uzbekistan in formulating a national ICT strategy is to not act fast or aggressively enough. Today the nation significantly trails the ICT standards of developed countries. Without embracing a program for change, it risks losing its ability to stay current or exceed its immediate peer group of competing countries. Defining and debating the intricacies of ICT domestic policy -- an ‘Uzbek solution’ for ICT – is an immensely valuable exercise. Policy planners and government leaders should however be mindful that in the world of ICT, time is a luxury. From the global perspective, Uzbekistan is already “digitally divided” from the developed world. Swift and energetic steps are required to mobilize society in support of ICT.

Failure to boldly promote ICT could prevent Uzbekistan from truly modernizing its economy and society. A gradualist approach will not work. Aggressive and willful political steps are required. The consequences of not acting could include falling further behind the global level of ICT; continued slow economic growth; failure to rapidly expand exports; inability to modernize domestic economic and governmental processes; and limited resources for raising the cultural and social living standard of the people of the Republic of Uzbekistan.

1.3 Preliminary Policy Recommendations

Based on the findings included in this e-readiness assessment – an analysis that combines both statistical evaluation with expert interpretations of the current ICT environment – we offer a few preliminary recommendations for potential consideration in the policy formation process. We have tried to identify the steps that Uzbekistan must take at home to spark the ICT revolution with energy and conviction. At the same time, our observations seek to incorporate a global perspective that reflects the world experience. Balancing domestic and international concerns will foster a policy environment optimized to attract direct foreign investment and, especially, to ensure successful privatization of state-owned ICT enterprises.

In this summary section, we offer general recommendations concerning overall ICT *policy*. In the individual chapters below, we also include additional specific action plans.

1. Telecommunications services should be readily accessible and inexpensive.

Creating the Internet society described by the President will be impossible without plentiful and cost-effective physical access to the Internet. To create this type of environment, clear and transparent policies and regulations are required to encourage private investment, increase competition, and improve supply of new ICT services.

2. Establish a firm roadmap for full liberalization of ICT markets.

The Government should set a timetable for the removal of preferential rights for State or private companies operating in the telecommunications and ICT sector. Certain sectors, such as ISP services, should be freed immediately from monopoly provisions (see #3, below). Private investors should be allowed and encouraged to invest in competitive local telecommunications infrastructure services with guaranteed interconnection to the public network backbone at reasonable cost, with rights ensured by law. An independent regulator needs to be established to promote active competition with the dominant telecommunications and ISP providers.

3. Immediately liberalize access to the Internet.

Decree #52 by the Cabinet of Ministers should be modified to allow ISPs to acquire international telecommunications circuits directly. This action will boost Internet capacity, lower end-user costs and speed broad exposure to the Internet throughout the Republic. Decree #52 was enacted in 1999 to serve specific Government interests related to managing content on the Internet. A detrimental side effect of the Decree established a monopoly in international Internet access at a period in time when open access is needed most. Market realities have changed over the past two years and the new situation demands greater market opening. ISPs should be allowed equal and immediate access to international facilities to improve basic access to global networks. Additionally, we believe that no preferential privileges should be granted to any operator. Multiple independent ISPs will speed deployment of the Internet in the Republic faster than a monopoly (or duopoly) by leveraging private sources of capital. These changes can be put into force without compromising state security interests by employing new monitoring technologies.

4. Launch an aggressive “e-government” initiative.

The Government should “lead by example” and quickly incorporate ICT into normal business operations to increase efficiency and improve information access to the public. Government information resources such as regulatory information, economic statistics, cultural and social data, and public services should be stored in unified modern databases. These data resources should be made available internally within the Government over the Uznets private network and to the public through open access via the Internet. Additionally, the Government should *mandate* that large enterprises be required to file taxes electronically, a program that could also significantly increase tax revenues.

5. Create a favorable investment environment for ICT businesses.

Companies that are primarily engaged in ICT should be given a suite of favorable tax, customs, excise and other incentives to accelerate import and adoption of current generation systems and software, and to encourage re-investment in domestic ICT enterprises. Fledgling ICT businesses should look to the government to establish productive enabling environment.

6. Establish incentives for direct foreign investment.

The ability to achieve an aggressive ICT modernization plan will depend on having available financial resources. Specific incentives should be adopted to encourage domestic and foreign investors to invest in Uzbekistan through venture funds and other private investment vehicles. Aspects of these incentives could include: removal or modification of existing investment regulations; ; tax and customs concessions, greater transparency in Government policy and decision-making; freedom to invest in any commercially viable enterprises, and other enticements to be determined.

7. Create ICT education centers of excellence.

In order to ensure training of the next generation of technology leaders, elite programs should be introduced at accredited universities. The focus of a higher educational program for ICT should be on information technology management skills rather than technical training per se. Uzbekistan needs future leaders who are equipped to apply ICT in support of the modernization of government and private sector enterprises. Additionally, it is necessary to devise a curriculum for highly specialized ICT technical training in line with international standards in preparation for the anticipated labor demand for workers with ICT experience.

8. Define a realistic program for domestic ICT localization.

An assessment needs to be made of the most appropriate sectors for local production of ICT products and services, and appropriate levels of government spending. This evaluation should determine where strongest core competencies exist, and propose a concrete action plan for development. Emphasis should be placed on introducing new research parks, free trade zones, and private/educational collaborative projects to leverage existing R&D resources. A similar assessment should be made of existing manufacturing enterprises with the best potential for transitioning to, or expanding, ICT product development. In this way the Government can determine the optimal level of state spending to spur sector growth.

9. Guide the public through mass media ICT awareness campaigns.

To ensure that the public firmly understands the value and potential of ICT, the Government and media enterprises should begin an ongoing series of educational and awareness campaigns. These initiatives should engage a wide variety of media and mass communications tactics. Importantly, the effort should seek a role that is positive and not frustrating; promotions should be calibrated with actual services that are available within the Republic.

2.0 Infrastructure

Of the six areas surveyed, infrastructure is absolutely the most critical dimension of determining Uzbekistan's "e-readiness." Without a reliable telecommunications network infrastructure, the prized benefits that the information revolution can bring to the economy, society, education and culture are effectively impossible. Access to telecommunications services should be abundant, readily accessible and inexpensive, and national ICT policies are required to ensure that the information infrastructure environment is allowed to flourish. The direction of a national policy for Internet infrastructure is closely intertwined with national telecommunications strategy and privatization of state-owned enterprises, a topic beyond the scope of this assessment. The analysis that follows has been prepared from the perspective of infrastructure for ICT readiness.

2.1 Principal Conclusions

1. Current infrastructure cannot support robust Internet and ICT services .

While the national telecommunications network has been developed to a satisfactory level for providing basic telephone services, the infrastructure is not optimized for high-speed data communications services such as the Internet. Domestic data network speeds have increased nearly 60 times in the past 18 months (from 19.2kbps to 2.0 Mbps), but capability and reliability still need considerable improvement. In the capital and big cities the majority of lines are digital and interconnection with fiber optic metropolitan rings. Nevertheless, the national telecommunications backbone network will be only about 76% digitized by 2003. Overall level of switching digitalization is 32%. Cables in the "last mile" of the local networks throughout the Republic are not suited to carrying data traffic.

2. The Republic's Internet capability is not satisfactory.

While Uzbekistan has a total of 44 ISPs, only four have direct international access to the global Internet and three are technically operating illegally. Total capacity linking Uzbekistan's entire population to the Internet is approximately 6.684 Mb -- about one tenth as much connectivity as that linking the 4,115 residents of Antarctica. Penetration of ISP services is concentrated heavily in the capital, and only four ISPs have operations in the regions. Ninety-five percent of all Internet users are in Tashkent. An absence of local "peering" keeps Internet costs high and network performance unreliable. Further, international access to global Internet capacity is constrained by government regulation.

3. Government Internet regulation suppresses rather than stimulates demand.

Government regulations, and especially Decree #52 by the Cabinet of Ministers, have created a monopoly on access to the global Internet. This effect of this policy is to increase domestic prices, deter competition, and stifle adoption of ICT and Internet usage everywhere in the Republic. Additionally, the monopoly granted to Uzbektelecom in local

telecommunications services impedes entrepreneurial investment and slows introduction of network capacity for new services.

4. Adoption of high speed local access services is non existent.

There are no high-speed public telecommunications access services offered such as ISDN, DSL or cable modems. With the complete absence of fast public data services, the only options for connecting to the Internet are through expensive private leased circuits or via dial-up modems where effective speeds are limited to about 44.0 Kbps. Without fast local access, new ICT services such as dynamic web access, streaming and multimedia, video conferencing, peer-to-peer computing, application delivery services and so on are impossible.

2.2 Strengths and Weaknesses

Strengths

- International fiber optic connectivity in place
- Reliable national telecommunications network
- Program in place to privatize state operators
- Legal basis for ICT relatively advanced

Weaknesses

- Monopoly in international Internet services
- Limited competition for basic network services
- Prices of international access and domestic leased services are high
- Insufficient domestic data network capability
- Weak local loop capable of supporting ICT and Internet
- International traffic artificially constrained
- Few incentives to encourage private investment

2.3 Summary of E-Readiness Data

Our investigation and analysis demonstrates that, in information infrastructure, Uzbekistan is presently at Stage 2 of the four-stage Harvard index. The net score for infrastructure is 1.89. This figure is an evenly weighted measure that compares seven independent variables: telecommunications infrastructure, capacity bottlenecks, available Internet services, Internet affordability, information transmission speed and quality, availability of terminal equipment and current level and type of use of the Internet. Greatest strengths lie in the basic telecommunications network and transmission capacity. Extreme weakness are experienced in the local loop and cost of Internet services. Note the figure below:

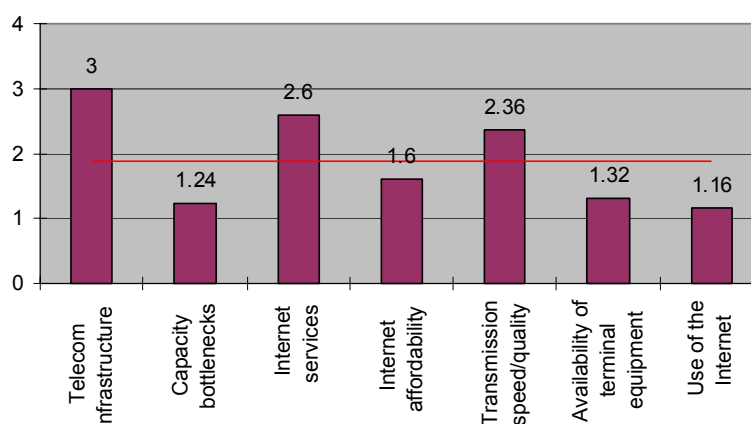
Investment in telecommunications infrastructure is low and does not begin to satisfy necessary upgrades to the national network. According to UZAP, total investment in the telecommunications sector in 2000 was 8,489 million soums (about \$64 million).⁴ The estimated budget for 2001 has fallen to approximately 2.537.3 billion soums, or about \$10.2

⁴ Based on a 2000 average exchange rate of USD\$1=131 soums.

million at the official exchange rate,⁵ far below levels necessary to prepare the country for ICT. A program to privatize the national operator, Uzbektelecom, is being managed by a consortium led by Commerzbank, Arthur Andersen and Laboef, Lamb, Green & Macrae. Up to 70% of Uzbektelecom is expected to be sold to strategic and/or private investors and the new partners will likely increase infrastructure spending dramatically. Tender documents are expected to be distributed by April 2002.⁶

Figure 2. E-Readiness Indicator for Infrastructure

Stage 2: Net score of 1.89



At the end of 2000, there were 1.8 million main lines in the Republic constituting an average penetration of 6.8 lines per 100 people. Resources are distributed unevenly between regions and cities. For instance, phone penetration in Tashkent is 25 while the rural area average is about 1.8. Approximately 68% of lines are analog, 32% are digital.

While there are six commercial operators of mobile communication in the country, the mobile telephone network is poorly developed with only 0.4 mobile telephones per 100 people. Four of the operators provides GSM services and the others employ the DAMPS standard. Total coverage of the country with mobile communication varies from 45% to 70%. *UZDUNROBITA* (DAMPS) provides roaming services for 70% of the country. *COSCOM* (GSM) provides international roaming services. Due to high prices of both handsets and services, mobile services are not affordable for the majority of the population.

All regional centers of the Republic are linked with Tashkent through fiber optic and microwave digital transmission facilities. Digital trunk lines provide connectivity at speeds

⁵ Based on the black market rate in July 2001, the real investment value is approximately \$2.6 million.

⁶ A variety of incentives will likely be offer to make Uzbektelecom attractive to potential investors. Proposals include contributing state shares in mobile operators and ISPs to Uzbektelecom's capital base; restructuring existing debt; as well as offering tax and other operational incentives.

up to 622 Mbps but leased facilities for end-user typically do not exceed 2.0 Mbps. Total length of the trunk network is 1700 km, which includes the Uzbek segment of Trans-Europe-Asia fiber optic fiber cable (TAE). Total length of major radio-relay lines is 890 km with a total capacity of 11,000,000 channel-km., of which 70% are digital. Only 40% of regional networks employ digital transmission equipment.

The integration of the national network with digital facilities is a significant accomplishment. However, overall data-carrying capacity of the data network – a crucial indicator when assessing e-readiness -- is marginal by developed world standards. Uzpak's data network is capable of transmission speeds from Tashkent to the regions ranging from 64 kbps and 2.048 Mbps (DS0-E1). To put this figure in the world context, a single small company with 50 employees in the United States is likely to use more bandwidth than the entire data network between Tashkent and Samarkand. Approximately 47% of the national data network capacity of 1452 ports is allocated to provide Internet services (692 ports). Uzpak intends to upgrade the national data network to ATM.⁷

International telephone access is a monopoly of *Uzbektelecom*. International capacity is a combination of satellite, microwave, copper and fiber optic cables. Total satellite capacity is equivalent to approximately 25 E1s, or about 50 Mbps, and provided primarily via Intelsat and Horizon space systems. In 1998, the Uzbek portion of the TAE was completed. Although TAE was intended to provide high-speed access to both Europe and Asia, problems with the Turkish leg of the TAE limit Uzbektelecom's ability to configure end-to-end circuits to Germany. Today international TAE traffic transits Kazakhstan and terminates in Shanghai with China Telecom. Of the total 155 Mbps capacity of the TAE eastern route, around 10% of capacity is currently in service. By the end of 2001 lit capacity is expected to rise to 25 Mbps. It is clear that the international fiber facilities are under-utilized. It seems apparent that outbound traffic is kept artificially low in order to promote international inbound traffic, thereby generating an imbalance of hard currency payments from international traffic settlements (current the inbound:outbound traffic ratio is 5:1). Moreover, the existing monopoly on international Internet channels almost certainly acts to limit real demand for international Internet services.

A major impediment to implementing widespread ICT throughout the Republic is the limited capability of the local switching and transmission networks. Today 1.8 million main lines are in service nationwide. The highest rates of digitalization are in Tashkent (70%), Bukhara (71%), Navoi (76%), Khoresm (60%) and Chircom (66%). These figures can be compared to average penetration of digital local switching in rural areas of about 32%. Most telephone stations in cities are connected via fiber-optic and microwave metropolitan rings.

Overall expansion of the local network is moving at a snail's pace. According to UzAPiT, only 6,200 new digital lines will be put in service in 2001. For the period 2001-2002, forecasts suggest that more than 200,000 new lines will be installed (expansion plus churn), to be financed by credits from international lenders.

At this stage there are not ISDN or xDSL services in use in the country.

⁷ A commercial contract valued at \$5.2 million is in negotiation at the time of this writing in July 2001. Uzpak selected to run IP over ATM to simplify interconnection with the existing public network.

Internet

Today Uzbekistan has an estimated 140,000 Internet users growing at an estimated 250% per year. Internet penetration is forecast to reach 1% of the population by the end of 2001. There are a total of 44 Internet Services Providers (ISP), but only five have direct international connectivity to the global Internet. All but five of the ISPs provide services only in the Tashkent (three are located in Fergana and one each in Karshi and Navoi).

Total aggregated capacity of all channels with direct access to the Internet is 6.864 Mbps. By comparison, the entire continent of Antarctica, with a population of 4,115, has Internet bandwidth totaling more than 60 Mbps, more than ten times the entire international capacity of Uzbekistan. All international Internet channels in service today are provided via satellite. Note the following:

Operator	International Bandwidth	Partner
UzPAK	1.3 Mbps	Telecom Italia MCI Worldcom GlobalOne Russia
Naitov	3 mbps	Teleross (Russia)
Eastlink	256 kbps	
Uzscinet (UNDP)	128 kbps	KPN (Holland)
Uznet/Sarkor	1 Mbps	TAE / ChinaNet
SITA	1 Mbps	
Total	6.684 Mbps	

Total capacity of modem pool in the country is estimated as 500 units, most of which have speed of up to 56 kbps. This speed, however, is practically unachievable due to the bad state of cables and transmission equipment in the local telecommunications loop. On analog lines, real average access speed does not exceed 19.2 kbps. On digital lines it is possible to commonly achieve speed of up to 44.0 kbps. Only four of the ISPs provide 24 hour help-desk services for end users.

Relative to its neighbors, Uzbekistan trails Kazakhstan in Internet development. While the following June 2000 data does not reflect recent market growth, the table below shows relative orders of development. Note that Uzbekistan's Internet population has grown from an estimated 7500 to 140,000 in one year:

Internet statistics of countries in Central Asia Vs other countries			
	Internet hosts****	No. Internet subscribers*	Users/1000
Central Asia			
Kazakhstan	4,199	70,000	0.42
Kyrgyzstan	3,050	10,000	0.21
Turkmenistan	499	2,000	0.04
Uzbekistan	235	7,500**	0.03

Tajikistan	231	2,000	0.03***
Others			
USA	41,625,753	143.96 million	52.24
Germany	1,916,512	18 million	21.74
Canada	1,814,505	14 million	45
Russia	260,373	9.2 million	6.3
Malaysia	64,081	1.5 million	6.88

*Source: Richard Labelle, UNDP December 2000. NUA, July 2000

**The actual number of users online in Uzbekistan is 140,000 as many users share the same Internet connection

***Note: Tashkent vs. regions

Total number of web sties registered in the .uz domain is estimated to be 309. Oddly, the .uz domain belongs to private German company, which makes decisions on the name registration. Statistics of site visits shows approximately equal numbers of visits to sites in Russian and sites in other languages.

Prices of access to Internet are high relative to local purchasing power. Price of an Internet connection averages 1000 sum per hour (slightly more than \$1.00). The cost of local phone calls to access Internet server, however, is negligible -- about 0.75 soum for *every other* minute (\$0.002). Price of 1 Megabyte downloaded through the dedicated line is 500 sum. Price of setting up a dedicated line is 36,000 soum, with monthly payment of 3,000 sum.

A critical weakness of the local Internet infrastructure is a complete absence of local "peering." Peering refers to how ISPs transfer Internet traffic to one another. Currently all ISP must pass through peering point outside of Uzbekistan, primarily in China. That is, unless two Internet users are using the same domestic ISP (such as .uzsci.net), traffic must pass through a peering point abroad. Distant peering dramatically increases costs to Uzbek users because of the need to use international circuits. Similarly, the speed and reliability of data transfer suffer. From the end-user perspective, and from the strategic view of improving the overall capability of the Internet and ICT in Uzbekistan, there is no good reason *not* to peer Internet traffic locally. The only real beneficiary of remote peering is Uzbektelecom. Because remote peering increases the amount of traffic into the country,⁸ the arrangement serves to increase the total traffic imbalance between Uzbekistan and the rest of the world. These benefits can be said to come from the pockets of domestic Internet users. Establishing a domestic private peering point will stimulate local Internet usage, lower costs and improve performance.

Internet Regulation

With the passage of the Decree #52 by the Cabinet of Ministers, issued February 5, 1999, a series of strict regulatory issues were put in place. The Decree granted monopoly rights to Uzpak by making it the only enterprise in the country formally allowed to directly interconnect with the international Internet. The intention of the action was apparently two-fold: to encourage development of a national data network operator with preferential

⁸ Web traffic is generally asymmetrical. That is, the query to a web site (traffic from the end user in Uzbekistan to an international web site) consumes far less bandwidth than the data that is viewed or downloaded (the information sent from the web site back to the user's terminal).

concessions; and, to centralize access to the Internet to enable close monitoring of unwanted content.⁹ Though the goals of the Decree were noble at the time, its repercussions have been severe. In a single stroke, Internet development in Uzbekistan shifted from enterprising free commerce, in accordance with industry experience around the world, to tightly managed state control. A firestorm of protest both at home and abroad quickly isolated Uzbekistan as a pariah in the global Internet community. The consequence of the Decree has been to raise the real cost of Internet access for Uzbek users and to suppress the democratic rights associated with the free flow of information.

Current market conditions suggest that aspects of the Decree have outlived their usefulness and in fact inhibit the President's ambitious vision to promote the Internet in Uzbekistan. As regards the Uzpak monopoly, global experience clearly shows that network access costs fall in competitive market environments. Preserving a monopoly on international access virtually guarantees that Uzbek Internet users will pay unnecessarily high charges. Additionally, entrusting global access to a company competing as an ISP ensures there will be a commercial conflict of interest between Uzpak and all other ISP in the Republic. A number of complex technical issues suggest that Uzpak could inadvertently use its dominant position to hinder other ISP's access to the global network. Several ISPs are technically illegal today as they obtain international access directly from satellite channels that bypass the Uzbektelecom gateway.

The approach to regulating unwanted content from the web set in motion by Decree 52 places a premium on *filtering* of content. That is, Internet traffic *to* and *within* the .uz domain scans and blocks content considered inappropriate for dissemination in Uzbekistan. Centralizing access to a single provider such as Uzpak makes this process easier. However, recent technology advances -- and in particular, network security developments in Russia and the USA -- suggest that network *monitoring* is more efficient than filtering. Monitoring enables appropriate government bodies to track web usage on an individual basis instead of draping a blanket over total information flows. Filtering also significantly slows Internet speeds, which again raises access costs. When a transparent monitoring system is in place, law-abiding Internet users can gain access to the information cornucopia of the web while law enforcement agencies preserve the right to protect state security. The difference between the two approaches is not semantic. Finally, Uzbekistan will in any case need to implement network monitoring to combat "white collar" computer crimes. Supplemental investments in filtering will raise the overall operational costs of Internet services in the Republic.

2.4 Recommendations

To accelerate improvements in the nation's infrastructure in support of ICT development, we recommend several recommendations for policy consideration and immediate action:

⁹ Sub-point 3 of the Decree states as an objective: "*- to secure the protection of information resources, imposing a ban on the dissemination of information containing calls for a forcible change of the constitutional system, propaganda of war, violence and pornography, sowing of seeds of religious and national dissension, infringement of human honour and dignity, as well as other information banned for the dissemination under the current law.*"

1. Eliminate restrictions on access to international circuits for the Internet.

Even as privileges are being considered to extend Uzbektelecom's monopoly on international long distance telephone services, ISPs and other telecommunications service provider should be allowed to immediately access international networks for data and Internet traffic. Under no circumstances should Uzbektelecom's monopoly on switched voice services be extended to data. Uzapak should compete with other ISPs on an equal and non-preferential basis.

2. Encourage competition in local telecommunications networks.

Even as privileges are being considered to extend Uzbektelecom's dominant position in local telephone services, the Government should allow and encourage competition in local network services. Open market opportunities should apply to any geography in the Republic, not only to rural areas. Competitors should be guaranteed equitable interconnection to Uzbektelecom's physical facilities and be allowed to employ private or foreign investment capital. Greater capacity in the local loop will catalyze Internet adoption.

3. Establish a local Internet peering point.

The current arrangement for Internet peering is irrational, uneconomical and unnecessary. A private peering point located on the territory of Uzbekistan should be put in service before the end of 2001. This facility should be carrier neutral so that all service providers can obtain local peering on an equal basis. The Government should *require* local ISPs to utilize local peering to lower Internet access costs for consumers.

4. Promote business conditions to encourage investment in ICT.

The Government should formulate a series of privileges and concessions to encourage ICT investment. These incentives could include lower taxes, customs duties and other fees that currently place a tremendous burden on ICT enterprises dependent on importing latest-generation technologies from abroad.

5. Take appropriate measures to control the .uz domain.

Uzbekistan's sovereign interests are being compromised by not managing ".uz" real estate on the Web.

6. Pass regulations that specifically allow voice over the Internet.

Today voice over Internet Protocol (VoIP) services are not specifically banned for individual use. Appropriate legislation and regulations should be passed that do not restrict how individual Internet users. More broadly, any service provider should be allowed to offer any Internet service that does not violate existing laws and regulations, to include making telephone calls over the Internet.

7. Aggressively develop wireless local loop technologies.

The "last mile" of the local access network is not at all equipped to provide high-speed access services to the Internet. Fixed wireless services, also known as wireless local loop (WLL), can provide rapid alleviation of last mile bottlenecks. To encourage competition and promote private investment, ISPs, entrepreneurs and other investors should be encouraged to build and operate local wireless networks for access to the Internet.

8. Define a realistic program for domestic ICT localization.

An assessment needs to be made of the most appropriate sectors for local production of ICT products and services, and appropriate levels of government spending. This evaluation should determine where strongest core competencies exist, and propose a concrete action plan

for development. Emphasis should be placed on introducing new research parks, free trade zones, and private/educational collaborative projects to leverage existing R&D resources.

3.0 Policy and Regulation

The development of information, communications and telecommunications technologies (ICT) can become an essential field in the Uzbekistan economy and serve as a primary driver for economic development. This is precisely the concept outlined in the President's speech to the Uzbek Parliament on May 2001 and the subsequent adoption of Resolution KM N230. ICT development is impossible without good quality Internet connections and services. In our opinion, the Internet is not only a part of the ICT, but also an essential component of modern civilization. Today a number of programs are aimed at the development of the Internet in Uzbekistan.

This chapter deals with legal and regulatory dimension of Internet related issues in Uzbekistan. We have attempted to capture the debate associated with the wide spreading of the Internet, and to introduce the key topics being discussed in legal court decisions and policy regulations in the developed countries. Public policy can be a help or a hindrance in the networked economy. The favorable climate that public policy can create for Internet use and e-commerce encourages communities, organizations and individuals to invest in and use information and communication technologies. Important aspects of Networked Readiness dealt with elsewhere in this report -- Internet availability and affordability, hardware and software availability and affordability, ICTs in schools and electronic commerce -- are all influenced by public policy. For a community to become ready for the Networked World, policy-makers must realize the implications of their decisions on ICT adoption and use.

There are a number of policy issues surrounding the Internet and electronic commerce whose stages of resolution are not clear, but which must be considered for their profound impact upon Networked Readiness. In general, policies should be enacted that ensure legal certainty, and security and consumer protection for online transactions and interactions. These include the resolution of issues such as transactional security, electronic contract enforceability and the authentication of individuals and documents. To achieve a well-balanced policy environment, clear frameworks need to be formulated that address:

- Articulation of a national policy for ICT development
- Liberalization of trade policy in ICT
- Protection of copyrights
- Information Security
- Promote wide access to information.

To resolve all of these issues, an appropriate mix of government regulation, market-based solutions and industry self-regulation should be put in place that considers both consumer and business interests.

3.1 Principal Conclusions

1. Articulation of a national policy for ICT development

No common government policy for ICT has been developed so far. Some legislative acts, however, cover some elements of ICT. Some legislative acts allow defining trends of the government policy development in ICT. It is necessary to develop a common program for the ICT development.

The following laws determine government policy on ICT in Uzbekistan:

- Law On Telecommunications
- Law On Communication
- Law On Radio-Frequency Spectrum
- Law On Mass Media
- Law On Informatization
- Law On guarantees and free access to information
- Law On Copyrights and Adjacent Rights
- Law On Licensing Some Kinds of Activities
- Law On Legal Protection of Software and Data Bases
- Law On Customs Tariff
- Law On Protecting Consumers' Rights

In addition to the laws, there are following national programs:

- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No.307 of 1 August, 1995 "On National Program for the Reconstruction and Development of Telecommunication Network of the Republic of Uzbekistan for the period till 2010"
- Resolution of the CM of the RU No. 193 of 22 April, 1999
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No.230 of 23 May, 2001
- "National Program for the Reconstruction and Development of Telecommunication Network of the RU for the period till 2010" (approved by the resolution of the CM of August 1, 1995 No.307),
- "The Program for Modernization and Development of a National Data Communication Network of the RU for the period from 1999 till 2003" (approved by the resolution of the CM of April 22, 1999 No.193),
- On measures for working out the Program for the development of computer and information technologies during 2001-2005, and ensuring wide access to international information systems of Internet" (resolution of the CM of May 23, 2001 No.230).

2. Liberalization of trade policy in ICT

Development of Internet technologies in Uzbekistan is constrained by a formal ban for providers to access international telecommunications networks, without using channels of the privileged national provider, *UzPAK*. This requirement was introduced by a resolution of the Cabinet of Ministers of the RU of February 5, 1999 No.52 "*On establishing a National*

Network of data communication and regulating an access to the world information nets”. Currently Internet providers are compelled to use *Uzbektelecom* channels in order to get connection with *UzPAK* and the global Internet. In many cases *UzPAK* capacity is not adequate to serve all network requirements. We believe it is necessary to abolish the *UzPAK* monopoly in access to international nets and give all providers the right for direct access to international data communication networks. The immediate effect of taking these steps will be to reduce the cost of services for Internet access due to enhanced competition amongst providers, and consequently make Internet affordable for wider audience in Uzbekistan.

3. Protection of copyrights

Uzbekistan should join basic International Conventions on Copyrights, specifically, the *Bern Convention on Protection of Works of Literature and Art and the World Convention on Copyrights* (Geneva Convention). Because Uzbekistan has not signed the convention, domestic authors of intellectual property do not have adequate protection of their original works, a lack of protection that reduces the export potential of Uzbekistan. Additionally, foreign authors of intellectual property do not get guarantees for protection of their rights in Uzbekistan. For instance, according to article 1063 of the Constitution of the RU, authors’ rights of foreign citizens are applied in the territory of Uzbekistan only for works, which have been made in the territory of the Republic of Uzbekistan, or an original copy of which is located in its territory, in any objective form. Lack of adequate protection of intellectual property rights of foreign citizens has a serious negative affect on the international reputation of Uzbekistan, and discourages inflow of foreign investments. In ICT specifically, foreign strategic investors and vendors of products with substantial intellectual property (e.g., software) will continue to be hesitant to participate in the local market. It is necessary to emphasize that the Conventions require compliance with the Agreement on Trade Related Aspects of Intellectual Property Rights, which is one of the main conditions for Uzbekistan to join the WTO. Uzbekistan needs to act swiftly to join International Conventions on Copyrights: *Bern Convention on Protection of Works of Literature and Art and the World Convention on Copyrights* (Geneva Convention).

4. Information security

Though Uzbekistan has created an appropriate legal basis for information security in ICT, current legislation focuses predominantly on protection of databases in bank activities. The primary task of legislation in this area is to develop regulations based on the Civil Code that extend similar privileges to individuals and legal enterprises. New legislation is required to address the following:

- providing for mechanism for legal protection of information from unauthorized use;
- requirements for protecting confidentiality by information owners;
- the procedures for restricting access to information that contains state or business secrets;
- issues of defining the intellectual property rights for information and information resources in ICT;
- Other aspects still to be determined.

Several security technologies are available and new technologies are being developed. The advantages of open source development in terms of security are becoming clearer. Much work has been done on formal methods and on security evaluation criteria. The use of

encryption technologies and electronic signatures are becoming indispensable, particularly with the growth in wireless access.

The Article 27 of the Uzbek Constitution states that: “Every human being has a right for secrecy of correspondence, telephone conversations, which can be restricted only on lawful grounds and in accordance with the procedure prescribed by law.” Cryptography addresses the modification of the information to make it unreadable for everyone but the addressee. In order to be read the cryptograms are to be deciphered. In a 1999 report by the Electronic Privacy Information Center, countries are classified according to how liberal their cryptography policies are, and ranked from red (not liberal) to green (liberal). The majority of European countries are in the green zone, including Germany, Scandinavia, etc. The citizens of these countries have the right to use any kind of cryptography available. The countries that have serve restrictions on cryptography are in the red zone, such as Russia and China. According to this classification, it can be said that Uzbekistan is in the green-yellow zone, ahead of the USA and the UK, since our nation currently has no formulated policy on the issue of cryptography.

5. Promote wide access to information.

Current legislation requires changes and amendments for wider access to databases. It is necessary to ensure full representation of government organs in Internet and application of modern ICT in inter-relations of government institutions at national level, as well as with any other persons, who are interested in obtaining public information. Wider access to information is required, especially for scientific, education and public institutions. It is important to join the efforts of state organs, public organizations and commercial structures for the ICT development. Comprehensive government support is required for all companies in the commercial ICT sector, irrespective of their form of ownership. Training of qualified staff will create conditions for emerging of competitive national enterprises involved in ICT development.

3.2 Strengths and Weaknesses

Key strengths and weaknesses of Uzbekistan’s in policy and regulatory environment for ICT can be summarized as follows:

Strengths

- The government understands necessity of developing of Internet access in Uzbekistan
- The government is preparing a program for developing Internet and National telecommunication networks (Resolution of The Cabinet of Ministers of the Republic of Uzbekistan No. 230 of 23 May, 2001)
- Principal existence of copyrights in Uzbek legislation (The Constitution, etc.)
- Proper legal basis for information security in bank activities.
- Existence of massive informational databases, which can be provided to wide range of people.
- Each state body has information that is of public interests. The various types of information include information on the personal rights of people, to information

about environment and business, and so on, and is readily available in electronic format.

Weaknesses

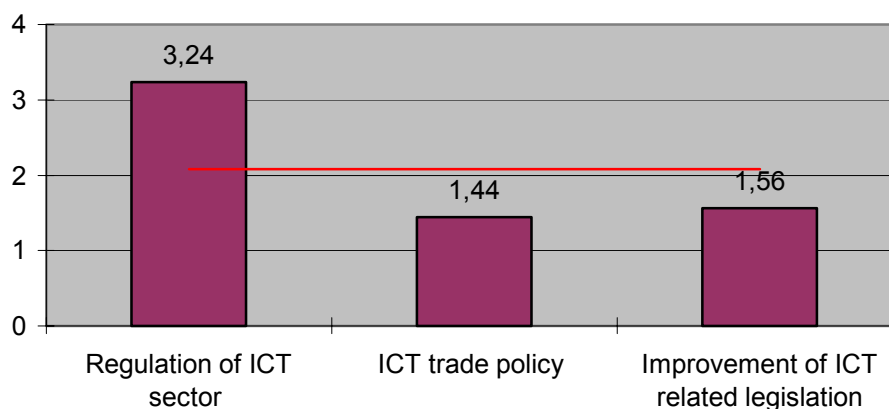
- Absence of cohesive governmental policy and supporting regulation for the development, usage, and regulation of telecommunication networks;
- Monopoly of Uzbeletecom in access to telecommunication channels severely restricts alternative, competitive and non-governmental providers of telecommunication services;
- Monopoly of UzPAK in access to worlds and International Communication networks keeps costs artificially high;
- Absence of legislation on electronic signature;
- Absence of legislation on electronic documents;
- Absence of legislation on electronic transactions;
- Absence of legislation on protection of personal data (including encryption);
- Uzbekistan did not join to international conventions on copyright and therefore lacks adequate protection of copyrights of foreign citizens;
- Existence of limited access approach in state bodies -- Government bodies used to be closed from any internal access and gaining access to information is extremely difficult without special permission;
- No electronic informational interactions of government bodies.

3.3 Summary of E-Readiness Index Data

In applying the Harvard e-readiness methodology we see that Uzbekistan is at Stage 2 in policy and regulation with an overall score of 0.52 (2.08). See the figure 3 and table below:

Figure 3. E-Readiness Ranking for Policy & Legislation

Stage 2: Net score of 2.08



Area	Coefficient	Stage
State strategy on development of ICT	0.81	3 (3.24)
ICT Trade Policy	0.36	2 (1.44)
Legislation improvement in the area of ICT	0.39	2 (1.56)
TOTAL	0.52	2 (2.08)

Our assessment shows that State strategy on development of ICT has the highest rating (0,81), based on recent efforts by the Government to define a national policy for telecommunications liberalization, privatize Uzbektelecom, and encourage private investment. While these programs have not yet actually been realized, the strategic plan is evolving quickly through the Government’s task force on ICT. This effort must be continued with conviction to finalize the national ICT policy.

The following section reflects in detail some of the steps required to improve the ICT policy and regulatory environment in Uzbekistan.

Tax policy relating to ICT is regulated by the Tax Code of the Republic of Uzbekistan and normative and legal acts. Article 24 of National Accountancy Standards provides for a possibility for accelerated depreciation of fixed assets, subject to their being greatly affected by scientific and technical progress. No special tax privileges, however, exist to encourage the process of the country’s computerization and ICT use. For instance, according to the instruction of the Ministry of Justice No.520 of 6 November 1998 *On the procedure for setting up VAT for commodities*, works and services imported to the Republic of Uzbekistan fixes VAT as 20% of commodity value. Given the fact that all high technology goods are very expensive, one can calculate how much total value of imported hi-tech equipment increase: customs fee is 30% for commodities, which have been produced and exported from the countries which signed the regime of trade favor with Uzbekistan, and 60% for other countries; VAT- 20%, customs procedures - 0.15%, declaration costs – 0.2% and more. Total taxes contribute some 50.3% of the total value of goods at a minimum.

In **ICT Trade Policy area** our findings is **0,36**. Significant improvements are still needed. In this context, we would also like to mention investments in Uzbekistan, which are regulated by laws “On Foreign Investments”, “On Guarantees and Measures for Protecting the Foreign Investors’ rights”, “On Investment Activities”. The issue covered in the Constitution of the RU as well as in other legislative acts is still open due to existing information vacuum in this area. We recommend that official legal electronic databases be established and made accessible through the Internet. In terms of ICT management in Uzbekistan, according to our data, no domestic peering point has been registered so far. This is another evidence of poor development of the market, as local peering plays an important role in supplying Internet services to population, which can be illustrated by so called “pairing” between providers of Internet services that significantly reduce prices of services supplied by Internet providers and improve its quality. Current legislation relating to protection of consumers’ rights, which includes Law on Protection of Consumers’ Rights and other legislative acts, is applied to consumers of ICT services as well, without taking into account specifics of the ICT market.

A rating of **0,39** was achieved for **Legislation in the area of ICT**. This score suggests that legislation in ICT area is relatively strong compared with other indicators, but of course remains low in comparison with some other countries. With this respect important aspect of

the ICT development in Uzbekistan, in our opinion, is working out a legal basis on the following issues:

- On electronic documents
- On electronic payments
- On digital signatures
- On information resources
- On insuring against information risks
- On protecting personal information
- On electronic transactions

Current legislation covers some aspects of these issues, while some issues are not mentioned at all, e.g. on digital signatures and electronic transactions. Article 366 of the Civil Code has a reference to a possibility to make a transaction through electronic or other means of communication, though legislation provides for no mechanism to define that a document originates from a party on contract. Practical implementation of this provision of the Civil Code is suspended due to lack of a corresponding legal basis and technological potential. There is no legal basis developed for electronic payments, except some provisions for the bank sector. We recommend developing a legal basis relating to the mentioned issues, based on the world experience. Development of an appropriate legal basis should keep pace with the development of market itself, so that market growth is not constrained by out of date legislation.

3.4 Recommendations

1. Government policy in ICT development.

Creation and implementation of unified governmental program in Internet area and in the area of informational technologies.

2. Elaboration of legislative base and regulation of ICT.

To overcome these weaknesses, and to leverage the legislative strengths already in place, we recommend that it is advisable to elaborate new legislation. In our view the Uzbek laws and regulations should be amended by adoption of the following laws:

- Law On electronic documents;
- Law on electronic transactions
- Law on electronic digital signatures.
- Law on protection of personal data
- Law on commercial secrets (confidentiality)
- Law on dissemination of information of government bodies
-

When preparing such legislation, we recommend applying experience of new industrial countries (Singapore, Malaysia) and Russia, where such laws have been adopted, for example:

- Typical law about e-commerce (Resolution of UN General Assembly A/51/628 dated 30.01.97);
- Directive of European Council 586(98) for some aspects of e-commerce in internal market;
- Directive of European Council 1999/000/EC of 29.07.99 about regulation of creation and use of electronic signature;
- Model law "About electronic signature", adopted by Resolution of Inter-parliamentary Assembly of CIS countries №16-19 dated 09.12.2000.

3. Improving protection of intellectual property rights for ICT creators.

- a) We recommend to include to Article 9 of the Law *On legal protection of computer software and data bases* a paragraph to stipulate the non-obligatory (optional) nature of registration of software and data bases pointing out the main purposes of such registration, and to exclude paragraph 2 of article 10 of this law.
- b) Article 23 of the law *On Informatization* should specify the notion of *information* as an object of intellectual property, in compliance with the Civil Code of the RU. Besides, the article should focus on defining ownership for information and information resources that contain materials, which are object of copyrights of other person.
- c) Uzbekistan should join the basic International Conventions on Copyrights: Bern Convention on Protection of Works of Literature and Art and the World Convention on Copyrights (Geneva Convention).

4. Proposals for protecting information security in ICT

With regard to protecting state secrets, the legislation should specify the following:

- a) A procedure for how confidential information is stored in digital form on computer information systems;
- b) Definition of authorities, and a list of actions they can undertake, for protecting information; and,
- c) Establish a procedure for ascertaining a legal fact of authorized and unauthorized access to information.

With regard to protecting information that does not contain state secrets, the legislation should specify:

- d) Procedure for ascertaining a legal fact of authorized and unauthorized access to information.
- e) Criminal liability for crimes committed by ICT means that is not covered by the Civil Code and other laws in this area; and,
- f) Adopt a legislative base for the encryption of the information.

4.0 E-Society

“Readiness depends on the community’s incorporation of information and communication technologies into the fabric of its activities in order to maximize the gains of joining in the Networked World. In society-at-large, ICTs can have a profound effect upon people’s professional and personal lives by providing easier access to information, more efficient ways to communicate and powerful organizational tools. To understand how a community is using ICTs, it is important to assess not only how many members of the community have access to the technologies, but how they are using them.”¹⁰

4.1 Principal Conclusions

1. Creating an “E-society” is essential.

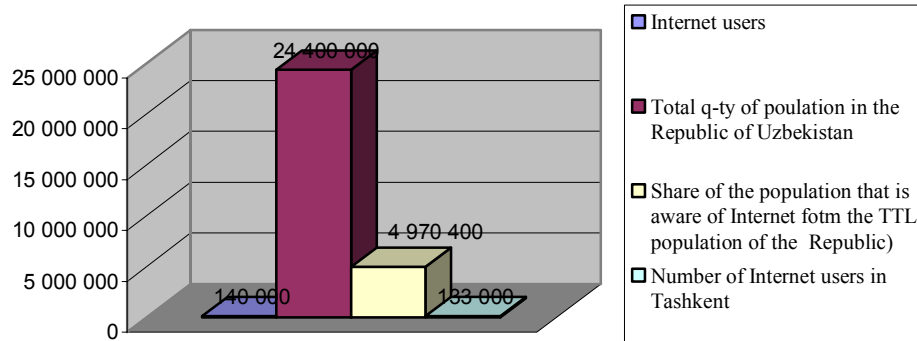
Readiness in ICT technologies is fundamental to joining the international community of nations. The most important elements of the readiness of information society are people and organizations, on-line users, communication technologies and new means of communication, providing access to domestic and international informational resources, the availability of the local resources, infrastructure and using of informational devices, such as radio, television, computers and others, their development in everyday life, using of the communication means at working places, that gives the quickest adopting to the global informational economy.

2. Usage of the Internet in everyday life is limited.

Low level of computer literacy, access to PCs, lack of public information on the value of the Internet – and of course low access to the Internet itself. Little information about Uzbekistan is on the web, due to the limited number of web pages and the fact that the government does not have commercial control over management of the .Uzbekistan web domain. Training is required of specialists with ICT and Internet skills.

¹⁰ Harvard University, *Readiness for the Networked World*.

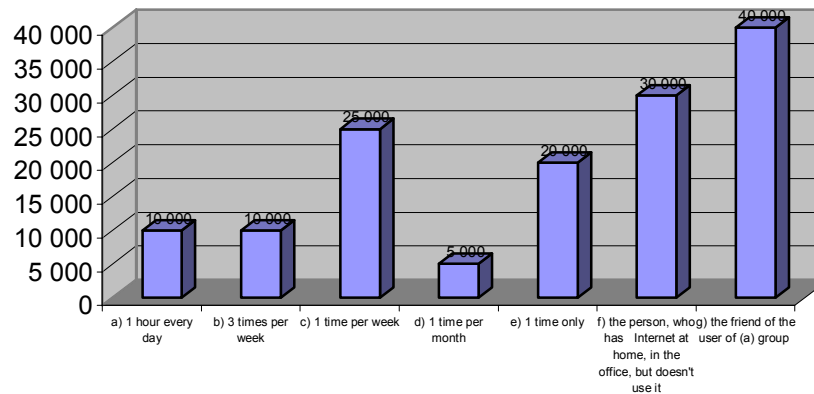
Figure 4. Internet Usage in Uzbekistan



3. Internet usage is growing rapidly

Uzbekistan is entering a vibrant period of ICT growth. However, 10-years spent behind the “iron curtain” and the general technical backwardness indicate that the Republic has a long way to go to catch up with the world technology leaders. With a population of 24 million Uzbekistan has only 140 thousand regular Internet users, or about 0,6% of the total population of the Republic. Note Figure 1 below. Of the total universe of Uzbek Internet users, 10 thousands use the Internet every day, 10 thousand use Internet 3 times a week, and 25 thousand use Internet once a week. See Figure 2. In Tashkent the number of Internet-users is 133 thousands, about 5,5% of the total population of the city. According to available information, the number of places of public access to the Internet and Internet-café has grown to approximately 60.

Figure 5. Frequency of Internet Usage



4. Web usage remains low

Nowadays there are 309 web sites registered and regularly are supported in Uzbekistan. Two sites are in Uzbek, 252 sites in Russian, 12 sites in English and 43 sites are bi- and or multi-lingual. See Figure 6. A total of 37 web sites are owned by government authorities, 42 sites by NGOs, 2 sites by local self-government authorities, 184 sites by commercial organizations and 4 sites are concentrated on e-commerce. The most popular sites in Uzbekistan are information and entertainment (50%), commerce (40%), NGOs (5%), sites of the central government (4%) and web-sites of local self-government authorities (1%). It is necessary to emphasize that nowadays the number of people using alternative devices such as mobile phones to access the Internet is very low, approx. 0,001%, but it is likely that greater usage will occur with time.

Figure 6. Number of Active Web Sites

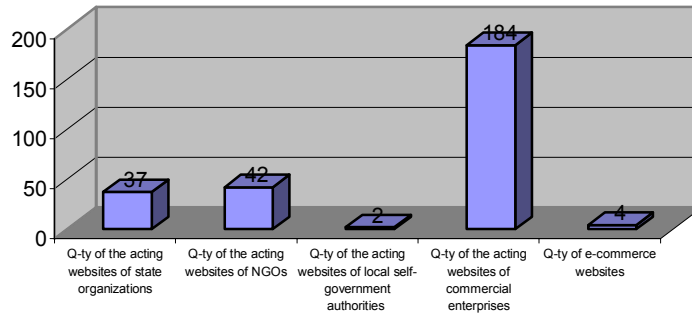
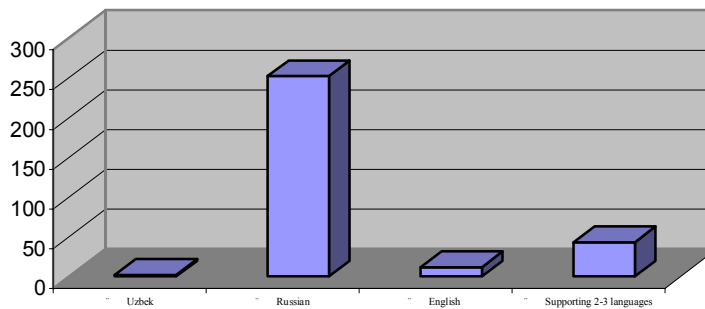


Figure 7. Primary Language of uz. Web Sites



5. Information about ICT in Uzbekistan is limited.

Unfortunately, there are no specialized publications on ICT in the Republic, but various information on this point is periodically being published in central republican editions and, also, in Russian editions, which are being spread in the territory of Uzbekistan. The number of copies of daily newspapers on 1000 people makes 8. The share of population that is aware

of the Internet is estimated at 4 970 400 people, or about 20,37% of the total population of the Republic. The national penetration of television sets is only 61 per 1000 people, and the penetration of radio-sets is 65 per 1000 population. There are a total of eight local radio channels and 25 TV-channels, 4 TV—channels of them are State channels. The percent of covering the territory of the Republic by TV and radio channels is approximately 98%.

4.2 Strengths and Weaknesses

Strengths

- Rapid growth in Internet adoption
- Growing public interest in ICT

Weaknesses

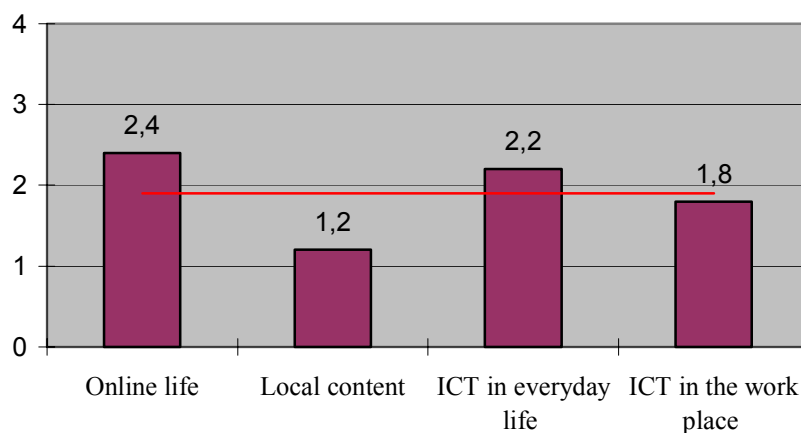
- Late start with ICT
- Infrastructure constraints
- Limited public information about ICT
- ICT not yet integrated in fabric of social and professional life
- Limited local content in Uzbek and .uz domain
- High cost to import latest technologies

4.3 Summary of E-Readiness Data

Uzbekistan's e-readiness ranking for E-Society is just nearly at the second stage, with a total ranking of 1.9. See the figure 8:

Figure 8. E-Readiness Ranking for E-Society

Stage 2: Net score of 1.9



People and organizations on line

Estimation – 0,6.

More than 20% of population has heard about Internet, even if a smaller number actually use it. Less than 1% of population of Uzbekistan regularly use Internet, but one in every 20 residents in Tashkent use it. Main users are males aged 10-35 but 20-30% are females aged less than 30 years old. There are just a few websites in Uzbekistan but its amount is increasing every day. You rarely can see advertisement of Internet companies on TV, and in many newspapers and magazines ISP and web design studios are advertised.

Local content

Estimation – 0,3

There are several web sites that describe local news and most of them are registered outside of Uzbekistan. Some of them are in Uzbek, but main part is bilingual (Russian and English). The number of existing personal web sites is difficult to define, because almost all of them are registered outside Uzbekistan in free services such as geocities.

ICT in everyday life

Estimation – 0,55

ICT (in form of faxes, pagers, computers, mobile phones) are used in limited degree by some citizens of the Republic but latest-generation Internet tools are not. Some citizens have Internet access at home. Some of them use Internet at work or in Internet café. Still practically nobody uses ICT for home purchases or banking, but a large number of users use ICT for communication with other users (chat). Public phones can be found almost everywhere; they are widely used and cost a little.

ICT at work

Estimation – 0,45

Usage of ICT at work is widely spread quantitatively, but just a little – qualitatively. Almost every office has at least one computer, which is used as typewriter or accounting. In most organizations accounting or warehouse calculations are automated in some way. As a rule, they use small and inexpensive systems, written by themselves (in case of large state institutions or ministries) or local companies – producers of software. Not many companies use full management production means responding to world levels of standard (SAP R/3, ORACLE APPLICATIONS, etc.). The number of organizations that have own web sites is increasing, but none of them have full corporate portals. A small amount of organizations have local networks used for internal information exchange. Some of them have a little client/server additions with central statistics base. There are 195 thousand enterprises and we estimate that 10% of them (19500) use ICT management systems. Banks are most computerized with computer at every working place, local network in every branch and distribution center, connection between branches via global network of Central bank, full banking systems, document exchange systems, etc. Almost all organization office workers have telephone access. Considerable funds have been committed by international donors to

modernize ICT in the banking sector. Generally speaking, it is necessary to increase the number of companies that specialize on Internet-service for corporate and private clients.

4.5 Recommendations

1. Encourage development of local web content.

There are catastrophically few web sites in Uzbekistan. As a result local content is extremely limited. It is necessary to establish social and commercial hosting centers which include services needed to create high quality web sites (professional web designers with possible activation of ready program modules: non stop news, message boards, chats, product and service catalogues, libraries, guest books, etc.) This would decrease international traffic and Internet service prices, and also increase the need of users to receive information from the net. Also, state statistical databases, libraries, reference book and other electronic information resources should be created.

2. Promote mass awareness.

To increase Internet interest in different social classes we need to periodically conduct different events to propagandize Internet technologies and Internet societies. Initiatives should include: seminars, conferences, congresses, competitions, and exhibitions. Also organize special educational programs to eliminate “Internet illiteracy”.

3. Encourage Internet cafes and other means of Internet access.

Most of the population does not have the technical means of access the Internet. We recommend that the Government stimulate the development of the public Internet access places, such as Internet café, Internet-labs, others with special incentives. Special programs should be elaborated for less mobile groups of population – women, disabled, old aged people.

4. Emphasize the role of educational institutions in promoting ICT

To engage the intellectual strengths of the students, scientific and medical workers, it is recommended that educational institutions, including colleges, special and high educational institutes, scientific organizations, medical organizations, libraries become united in a republican scientific-educational network with access to the global Internet.

5. Government should lead an e-Society initiative

We recommend to elaboration and integration of an e-government program, which would include network of ministries, institutions, governmental bodies, document turnover system between ministries and governmental bodies, offering consulting, information and other services for individuals and companies and organizations via Internet.

5.0 Networked Economy and Government

Networked Economy refers to the provision of electronic goods and services. When implemented broadly in a society, ICT helps to streamline supply chain and inventory management, increase transaction security, improve consumer choice, reduce costs associated with physical infrastructure, augment marketing outreach and public relations, processing billings and payments more quickly, among other advantages. Moreover, networked businesses are likely to explore new business models, including dynamic business partnerships and radical market restructuring.

Electronic Government allows governments to modernize operations and to offer information and to interactive services online to the general public using the Internet. In Uzbekistan, the state is a primary engine for economic growth. The Government has an opportunity to “lead by example” and become a catalyst for the domestic networked economy. Investing in ICT for their internal usage will lead to more efficient operations and stimulate the local market for ICT goods and services. Relationships with government contractors and procurement mechanisms can be streamlined by putting them online. ICTs can make government activities more transparent to citizens and other observers.

5.1 Principle Conclusions

1. Usage of ICT in the government is limited.

Computing technologies are employed in ordinary affairs of government – day-to-day operations, statistics keeping and internal communications and so on – but there is no “E-government” management in the modern understanding of the word. The use of large managed databases is not common and there is no unified intranet linking government offices. Individual ministries manage ICT programs independently; the lack of government-wide standards creates investment inefficiencies through duplication of efforts and frequently results in the deployment of incompatible systems and network architectures. The overall information policy of the government seems to have developed from a history of proprietary control over information rather than employing information as a broadly available public good.

2. Very few government services are offered online

Even while the state sector dominates the economy, few government services are available from government web sites and portals. For example, commonly sought information such as data about pensions, customs regulations, employment services, government legislation and decrees and so on cannot be obtained electronically. Similarly, there are no interactive services such as electronic filling of tax declarations. Clearly, Uzbekistan is at the very earliest stages of putting government information and services online.

3. The government computer network is undeveloped.

Efforts to establish a governmental computer intranet have been constrained by poor public communication infrastructure generally and by the absence of a clear commitment to embracing ICT throughout government operations. Systems and information management processes that are in place today, which were first developed in Soviet times, serve the vertical interests of specific agencies. Most of the systems are incompatible with one another. Today there is no unified infrastructure or information management framework that can provide cohesive e-government services.

4. The banking sector has an elaborate inter-bank clearance network

Uzbekistan has benefited from substantial assistance programs led by the World Bank that have helped establish a world-class banking network environment. Many commercial banks in the Republic already offer electronic management of accounts for legal entities and the system could be used to accelerate dissemination of business-to-business (B2B) in the industrial and services sectors.

5. Critical technical components for e-commerce are missing.

Currently several aspects of the technological foundation for e-commerce are absent. There is no domestic digital certificate authority nor public key infrastructure (PKI); penetration of core interaction transaction technologies such as firewalls and secure servers do not appear to exist; and even relatively simple e-commerce tools such as secure socket layer (SSL) technology are not in use in web sites in the .uz Internet domain. More broadly, neither a government strategy nor appropriate technological architecture have been articulated for electronic payment systems using the web.

6. The legislative basis for a networked economy has not been adopted.

Critical elements of legislation that will speed potential adoption of e-commerce have not been adopted. Articles yet to be defined include laws on digital signatures, privacy, copywrite, information security, and so on (see 3.0 Policy and Regulation).

7. There is no centralized source about ICT in the Republic.

The Government does not keep centralized statistics on the current state of ICT adoption and penetration.¹¹ At a result, it is difficult for potential investors, domestic entrepreneurs and policy-makers to accurately gauge the true nature of the networked economy in Uzbekistan. Disparate sources of information, and a general reluctance to share statistical information, make data collection extremely difficult.

5.2 Strengths and Weaknesses

Strengths

- Uznnet internal network for Government
- Excellent banking network in place
- Strong domestic systems integration capability

¹¹ One of the objectives of the UNDP HDRC project is to create the basis for ongoing monitoring of statistical information.

- Available pool of local world-class developers

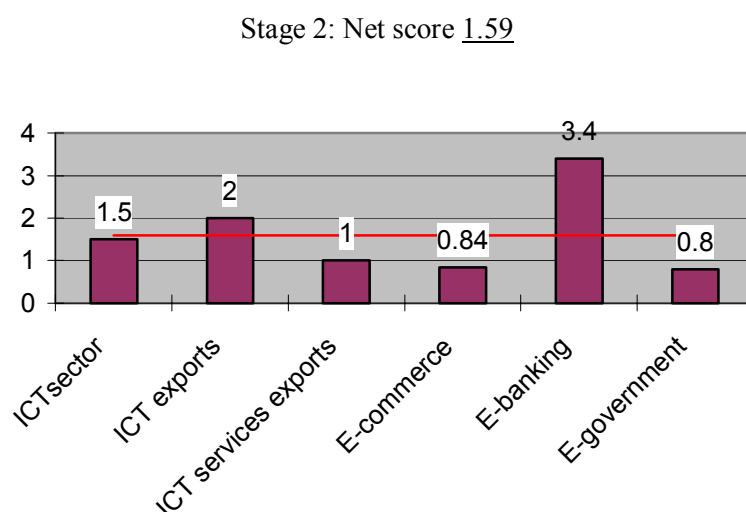
Weaknesses

- Limited governmental computerization
- Absence of integrated E-government development program
- No domestic digital certificate or public key encryption technologies and extremely limited usage of firewalls, secure servers and related technologies
- Virtual absence of electronic cards and personal payment systems
- E-commerce supporting legislation not in place (see 3.0)

5.3 Summary of E-Readiness Data

Uzbekistan's e-readiness ranking for Networked Economy and Government is the middle of the second stage, with a total ranking of 1.59. See the figure 9:

Figure 9. E-Readiness Ranking for Economy & Government



Electronic government clearly has one of the lowest ratings on the indicator (0.8), owing to the nascent stage of e-government initiatives in the Republic. E-commerce is also legible today (0.84). However, the banking system is very positive asset that will serve overall efforts to promote electronic government and a networked society.

An important component of promoting B2B commerce is introducing trading web sites within large commercial enterprises. We believe that this activity can be created within a reasonable period (from 6 months to a year), using the potential of local companies creating interactive applications and web storefronts. Some of the different forms of e-commerce activity that can be introduced from these sites in the near term include secure electronic commerce transactions; auctions with various sizes of commodity and service lots; or a mixture of the two.

Among the obstacles to implementing B2B services in Uzbekistan is that high-speed, always-on communication infrastructure is expensive. With the current high cost for telecommunications access, it is not clear that online services can be profitable due to the high cost of computing equipment required.

Introducing web-based electronic sales of retail services and commodities between producers and consumers – B2C – presents a greater challenges. Among the key obstacles to B2C include the present inability to verify secure buyer authorization and the absence of cashless settlements systems, including micro-processor based cards (MPC). Introduction of this segment of the market is constrained by lack of a clear program for setting up a national MPC system of cashless settlements on a nationwide basis. Implementation of such a program will provide a wide possibility for retail traders and merchants to use electronic trade in their activities, subject to reasonable rates of services. Setting up a national system alongside introducing free currency convertibility will provide a possibility for integrating consumers to the world market of e-commerce.

Electronic delivery of documents (file transfer and email) has been introduced into 30% of government agencies. The agencies most likely to have made the transition to electronic communications systems are those equipped with private corporate data communication networks. These institutions and ministries include the Tax Committee, Central Bank, Ministry of Internal Affairs, Ministry of foreign Affairs, and the military.

5.4 Recommendations

Recommendations for the creation of “E-government”:

1. Concentrate government spending on ICT in a central body.

By creating a singular ICT modernization program for government bodies, it will be possible to set uniform standards, eliminate resource duplication and over-investment, and help make all state agencies more responsive.

2. Extend Uznet to all agencies.

Uznet is an excellent basis for providing ISP and connectivity services for the government and should be extended to all agencies.

3. Establish a uniform virtual private network for Government.

A single applications operating environment should be established for common tasks used throughout government. Today there are numerous technologies and networks in use for email, data transfer protocols, terminal equipment and standards, web site format, and so on. Because most Government agencies are at the early stages of ICT modernization, it may be possible to take these steps without being encumbered by “legacy” technology investments.

4. Develop and promote governmental information databases.

Information about government affairs and processes – both public and proprietary data – should be structured and stored in state-of-the art computer databases. Modern database technology will quickly increase efficiency in government operations as well as improve management, distribution and security of government data. Structured databases will also form the basis for future Government web portals to provide up to date information to the public and potential investors.

5. Create an electronic taxation payment and monitoring system.

ICT can help the government significantly increase tax revenues through improved monitoring and collection. Computerization of the tax payment system and, especially, integration with the existing banking network, can rapidly promote greater transparency in tax payments. Large enterprises should be required to file taxes electronically.

6. Create centralized repository for information about ICT.

Today information about ICT is scattered among a variety of sources, with even reliability. The responsibility for annual tracking of sector developments could be a part of a new regulatory agency or ministry. Tracked information should be made publicly available.

Recommendations for the creation of a Networked Economy:

7. Pass appropriate enabling legislation.

The Government needs to put in place a clear legal framework to eliminate ambiguities about the development of e-commerce. Some of the articles that need to be addressed include laws on digital signatures, privacy, copyright, information security, and so on (see 3.0 Policy and Regulation).

8. Create e-commerce settlement capability

The banking network is optimized for inter-bank clearance and remote management of enterprise accounts. It is not yet prepared to manage clearance of online payments from e-commerce web sites. A plan for extending the banking network technology needs to be implemented to enable future online e-commerce. Additionally, in advance of widespread adoption of personal credit cards, it is advisable that “lower tech” solutions for cashless transactions are introduced. For example, pre-paid retail debit cards could be used to enable online transactions for certain goods and services.

9. Provide tax incentives for ICT and online businesses.

6.0 Education

The use of ICT in education is one of the most powerful catalysts to networked readiness but it is an opportunity that is often underestimated or misunderstood. According to Harvard, “schools must integrate ICT tools into their learning processes if they are to be a part of the Networked World. Programs that give students access to information and communication technologies in the classroom provide an important step to improving Readiness. A schools’ Readiness in terms of access can be broken down into six broad categories: number of computers, physical access to the technology, types of computers, diffusion of the network, access to and organization of electronic content, and quality and speed of connectivity in the schools.”¹²

6.1 Principal Conclusions

1. Education institutions do not meet modern ICT standards

Education institutions are not supplied with modern telecommunication services. Today electronic training tools are virtually absent in the educational process and all levels of expert training lack up-to-date and well-coordinated curricula. Educational institutions at all levels have limited access to ICT resources. This situation can be explained by lack of computers, digital phones or means of telecommunications, expertise and funds.

2. Lack of network access

There is no national educational and scientific research network. Inability to communicate with peer institutions at home and colleagues abroad hampers education and training at all levels.

3. Schools are unable to invest in ICT

With the exception of a few schools specialized in ICT training, ICT spending constitutes an insignificant part of total budget of schools at both the secondary and tertiary level.

4. Few standards exist for ICT training

Today there is not a well-formulated national curriculum to advance ICT education at either the university level or for ICT technical training in secondary schools.

6.2 Strengths

Strengths

- High literacy rate
- High correlation of ICT professors to total number of professors
- High usage of ICT among professionals

¹² Harvard E-Readiness Guide.

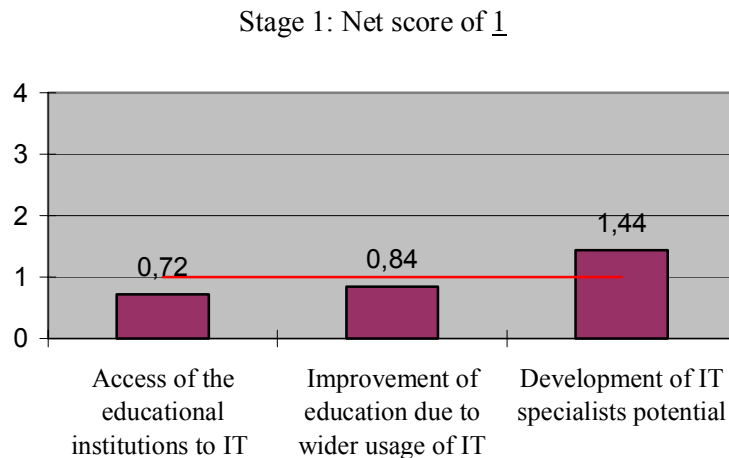
Weaknesses

- No national educational and scientific research network
- Number of the students per computer is low
- Share of the networked computers in education is low
- Availability of electronic training tools and supplementary materials is practically zero
- Limited training software in local languages
- No centralized data tracking IT purchases by educational institutions, making normative analysis impossible
- Number of training and educational web sites to the total number of web sites is very low.

3.3 Summary of E-Readiness Index Data

Uzbekistan 's e-readiness ranking for Education is at Stage 1 with a net score of 1.0. See the Figure 10 below:

Figure 10. E-Readiness Ranking for Education



Generally speaking, the human resource ability to absorb new ICT in the education process exceeds the system's ability to create appropriate opportunity. Teachers and students are keen to embrace ICT tools and development programs but lack the financial resources to invest in equipment and software.

According to the UNDP report «*Central Asia 2010, prospects of human development*», the literacy rate of the adult population in Uzbekistan is 97.2%, very close the developed country average of 98.6%.

Currently there are 9665 secondary schools in the Republic. Professional education is being reformed and a two-stage scheme of education (for bachelors and masters) has been

introduced in national universities. While the overall structure of reform is progressing well, little headway has been made to date on modernizing education through ICT.

Secondary schools on average possess one up-to-date computer (Pentium II or newer) per 100 pupils of 8-9 grades. This figure can be compared with a West European country average of 10-15 computers per 100 students. Fewer than 2% of secondary schools have computer classrooms equipped by network means, only 0.12% of secondary schools have access to Internet. Of 306 colleges, gymnasiums and schools, only 22 have Internet access. School libraries lacks fund to introduce electronic network access including to the Internet.

Today the combined limitations of inadequate hardware and software, content of training programs, and the professional level of teachers and trainers means that the Republic's secondary schools are unable to ensure training of medium level IT experts for the labor force.

National universities prepare qualified experts, including those who are specialized on IT, by producing bachelors (4 years) and masters (+2 years). Specialized ICT courses contribute an estimated 16% of total university curriculum subjects. Students at the bachelor level typically learn about ICT and the Internet privately outside of the formal course of university study. Provision of universities with computers averages 3.3 per 100 students, as compared to 35-37 in developed countries; overall PC penetration ranges from 2.1 to 17.7 units per 100. Universities have limited access to Internet. According to the estimation of Uzbek Mail and Telecommunication Agency, only 45 of 61¹³ have connection to Internet.

6.4 Recommendations

1. Establish university ICT centers of excellence

In order to ensure training of the next generation of technology leaders, elite programs should be introduced at accredited universities. The focus of a higher educational program for ICT should be on information technology management skills rather than technical training per se. Uzbekistan needs future leaders who are equipped to apply ICT in support of the modernization of government and private sector enterprises.

2. Create a national educational research network

Educational networks constitute a critical part of the Internet. Uzbekistan needs a national educational and scientific research network to improve information sharing among institutions throughout the Republic and with centers of higher learning abroad. A centralized research repository (educational database) is needed to archive latest domestic research and this data should be interconnected with the national governmental network and with the global Internet. A national educational research network will ensure that new teaching and training materials are disseminated quickly and at low cost. It will also create a "tide of rising standards" by ensuring that the best new ideas are in wide circulation.

3. Encourage international technology companies to provide training.

The best technology training is provided by global private companies. The Government should seek to establish cooperative training programs with private companies that can offer

¹³ Alternatively reported as 40 out of 62 universities.

training and accreditation on latest ICT technology environments appropriate to Uzbekistan. These programs could involve local teaching as well as “virtual universities.” International donors should be approached to offer cooperative funding to underwrite such initiatives.

4. Identify and catalog immediate ICT needs for education.

A prioritized list of electronic training materials for all levels of education needs to be developed that includes specific near-term requirements to enhance ICT use in education. Topics that should be covered include: development and dissemination of electronic training materials; establishing electronic libraries and ensuring access to its resources; organization of a system of delivery (dissemination) of electronic training and methodological materials; organization of a system of distant training and consultancy for students of education institutions of all levels.

5. Improve qualifications of teaching professionals

Introduce technical training standards – a “train the trainers” program -- for teachers at all levels including administration, engineering and technical staff. Additionally, it is necessary to devise a curriculum for highly specialized ICT technical training in line with international standards in preparation for the anticipated labor demand for workers with ICT experience.

6. Gradually increase supply of ICT teaching materials

Improvements in ICT education will ultimately come only through increased investment in new hardware, software, network access and training materials.

APPENDIX 6: PROJECT TEAM

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