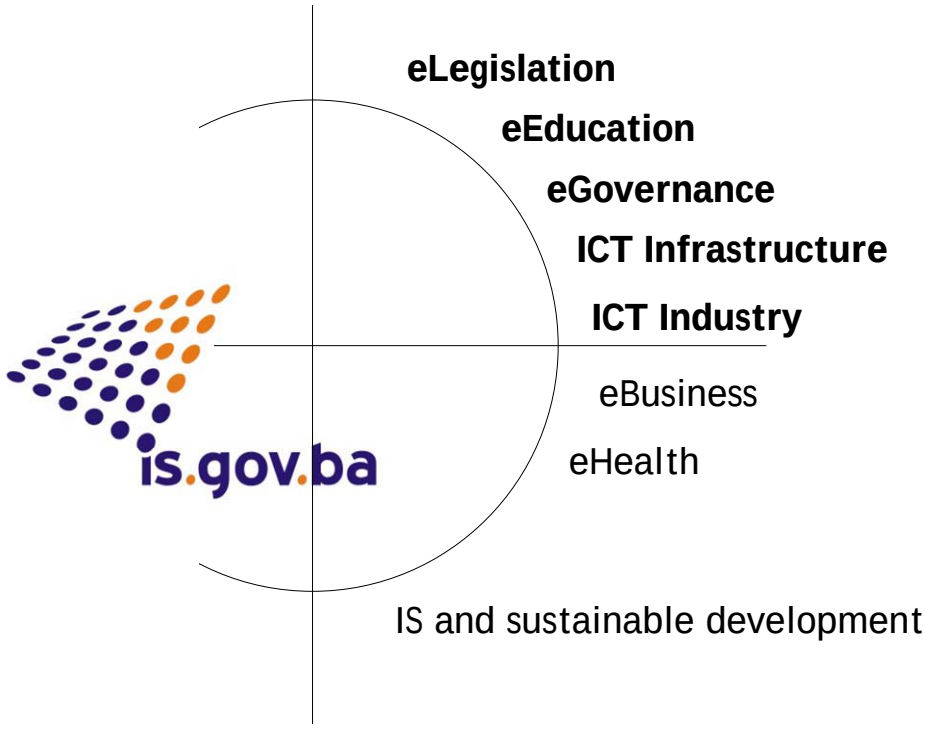
Council of Ministers of Bosnia and Herzegovina
Vijeće Ministara Bosne i Hercegovine
Савјет Министара Босне и Херцеговине

Strategy of Information Society Development in Bosnia and Herzegovina



Council of Ministers of Bosnia and Herzegovina

United Nations Development Program in BiH

Project: Strategy of Information Society Development in Bosnia and Herzegovina

Full document title:

Strategy of Information Society Development in Bosnia and Herzegovina

Purpose of the document:

Strategy of Information Society Development in BIH is a document that provides strategic guidelines and plan of actions for development of information society in Bosnia and Herzegovina for the period 2004-2010. The strategy is based on vision and goals defined in the Policy of Information Society Development in BIH.

Although the Policy is based on eight development pillars, this version of Strategy is related to five development pillars:

- eLegislation
- eEducation
- eGovernance
- ICT Infrastructure
- ICT Industry

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CONTENTS IN BRIEF

CONTENTS

ABOUT THIS DOCUMENT

Bosnia and Herzegovina should not stay out-of-the-way and isolated from current globalization trends including development of modern information society based on knowledge and information and usage of information and communication technologies in every day life.

Furthermore, processes of informatization and such transformative changes should not happen haphazardly. By using experiences from other countries these processes are to be promptly directed and developed.

In cohesion with aforesaid the Council of Ministers of Bosnia and Herzegovina has laid a foundation to the process of designing Policy and Strategy for development of the information society in BIH as a blueprint for development of the information society in BIH.

Policy for development of the information society will serve, in the process of growth and building information society, as a comprehensive and fundamental document for imposing laws, regulations and other acts, defining developmental trends, action plans and priorities on BIH level and its entities.

Policy also defines preparation of strategies for development of informatiom society in different developmental sectors (ICT Infrastructure, ICT industry, eBusiness, eEducation, eHealth, eGovernance, legal infrastructure and informatiom society and susteinable development.)

This document contains Strategy for Development of Information Society through five developmental pillars:

- Legal infrastructure
- eEducation
- eGovernance
- ICT Infrastructure
- ICT Industry

Strategy for Development of Information Society tackles the time-frame from 2004 – 2010

Ordering party is the Council of Ministers of Bosnia and Herzegovina

The Document has been prepared in cooperation with the United Nations Development Programme (UNDP) in Bosnia and Herzegovina

Strategy articulates the priorites and guidelines expressed in the Policy for development of information society in BIH, and delineates modalities for their implementation. The role of the Strategy is therefore to offer full support of the modalities defined in the Policy for development of information society in BIH.

Actually, for each of five developmental pillars the Document provides:

- Overview of the present situation
- Vision of the progress
- Major strategic guidelines for the achievement of the vision
- Specified actions to be enforced in accordance with the strategic guidelines

Overview of the actions envisaged in the Action Plan has been attached to this document.

The Action Plan, itself, offers more detailed description of the specified actions, including benchmarking indicators.

eLegislation

The increasingly mass and fast creation and application of information-communication technologies is a world trend. This transformation also affects the law. eLegislation represents establishing norms for specifics that are caused in individual institutions and branches of the law by the application of information-communication technologies. As such, the eLegislation serves as a prerequisite for the acceleration and overcoming of the insufficiencies to which Bosnia and Herzegovina has been exposed due to various circumstances.

As opposed to the approach of other international organizations, the characteristics of the harmonization of the national laws that the European Community insists upon are: necessity, establishing minimum common content, horizontal impact, freedom of choice with regard to the harmonization methods, possibility of direct impact, as well as the possibility for natural and legal persons to apply these guidelines.

If Bosnia and Herzegovina wishes to become an EU member, it has to harmonize its legal system with the community law of the EU. The harmonization must include the legal regulation adopted at the level of individual international organizations of the UN, as well as the regulation of individual international professional organizations. That is why the EU community law should represent the basis for the eLegislation in Bosnia and Herzegovina.

The necessary changes to the legal system of Bosnia and Herzegovina can be summed up as follows: defining the legislation at the state level, defining entity legislation, harmonization of entity legislations, reduction of the decision-making level, adopting the regulation in accordance with this document, harmonization of the existing regulation with the new eLegislation, establishment of an organization and managerial body to perform the education, monitoring and all other post-project activities. The project activities related to the eLegislation implementation include the following areas: legislation for the eBusiness, legislation for the eGovernment, legislation for the eEducation, legislation for the ICT infrastructure, and the legislation for the ICT industry.

1. INTRODUCTION

1.1. ENVIRONMENT FOR THE PREPARATION OF THE STRATEGY AND THE ELEGISLATION ACTION PLAN

The information society development in Bosnia and Herzegovina came to a sudden halt with the breakup of Yugoslavia and the subsequent war. The drawback of development was that more dramatic because it occurred in the period of explosive development of the ICT and its application at the global level. The reconstruction period brought significant, yet insufficient results in this area. The overview of the achieved state of the information society can be found in the study prepared by the UNDP BIH, that was a part of the ICT Forum: "Report on eReadiness of BIH – A Preliminary Study"[1]. The data relevant to the eLegislation shows that there were 300.000 PC in households of BIH in 2002, and that there were more than 500 web sites, as well as more than 100.000 Internet users.[2] The urban population benefits from this state the most. "Digital divide" affects the rural population in our country too, and presents one of the major obstacles to the development of the BIH information society.

There are three factors that demonstrate a radical influence over the BIH environment in relation to the eLegislation. The first factor is the extreme speed of the IC technology and infrastructure development.[3] The second factor is that the information revolution, unlike other vital changes, cannot withstand even brief legal vacuum. If the gaps should appear, they shall be filled by the businessmen themselves, by creating the soft law, or in other organized methods. Thirdly, a further widening of the authority of the common institutions of BIH is to be expected in various areas of society and economy. A reasonable assumption is that, in due time, a greater degree of cooperation among the Council of Ministers, executive and legislative bodies of the Federation of BIH and the Republic of Srpska will be achieved. One of the basic prerequisites for the realization of this requirement is the reduction of the decision-making level, both in the legislation and in the administration, because BIH cannot tolerate the existence of legislative authority at all levels of the state organization: Bosnia and Herzegovina, entities and ten cantons within BIH. The only way is to strengthen the legislative authority of the state.

1.2. CURRENT AND FUTURE TRENDS – GLOBAL AND REGIONAL

A general trend in the world, that is becoming increasingly globalized, is the mass and quick creation and application of information technology. The postindustrial society is transformed into information society. This transformation affects the law, as well.

The application of the ICT causes, on one hand the change of a number of classical legal institutions (e.g. eSignature), and concepts (e.g. eBanking, "consumer contracts").

The results are: the presence of the ICT in all areas of life, and especially in economy, an unforeseen possibility of the access to information, especially of public nature, and a radical increase of liberties. These trends required the establishment of special policies, institutions and legislation dedicated to the creation, maintenance and advancement of the information society.

A specific document that needs to be mentioned is G-8, the Action Plan to Decrease the Digital Divide between the developed and the developing countries, and the activities of the UN.

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[1] Published by the UNDP B&H, Sarajevo, May 2003.

[2] Data resource: "Remark to Present Brief Comments on General Political, Social, and Economic Issues of BH Situation", presented at the ICT Forum 2003.

[3] Consult the BH ICT Forum publication titled: "Information and Communication Technologies for the Information Society", UNDP, Sarajevo 2003.

The EU policy is relevant to us at the regional level. That is why we shall name its major papers:

- eEurope 2002 Action Plan
- Preparatory Documents of the eEurope 2002 Action Plan
- Papers of the Cross European Network relevant to the telecommunication (Art. 154 through 156 of the Articles of Incorporation)
- Art. 59 – 66 of the Articles of Incorporation that ensure the freedom of service providing, also in the area of telecommunications, including those provided via the Internet
- Article 81 (85) and 83 (86) of the Articles of Incorporation, together with the regulation of exceptions, that enable the research, development and joint ventures in this area, and
- The International Market Harmonization, as a document that opens the market of the telecommunication services in the EU.

The eSEEurope Agenda can also be included in this list. It encompasses BIH and neighboring countries.

The international institutions working on the eLegislation can be divided into governmental and non-governmental institutions. The most important member of the first group is the UN. In addition to the UNCITRAL, they realize their activities through the UNDP and the EEC. In addition to the UN, we must mention the WTO, because of its agreement with the TRIPS, and the WIPO as the regulator of the changes caused by the application of the ICT in the area of intellectual property.

The most prominent non-governmental organizations are the International Chamber of Commerce in Paris (ICC) and the Comite Maritime International (CMI). Their activities are divided into sectors, and relate to the electronic documentation.

The legal nature of eLegislation is under major influence of the type of institution that passes it. The UN and NGOs are directed towards the soft law. They aim at harmonizing the state law with the international procedures through model bills and determining the standards of best practice in specific areas. The most important documents of this group are the following:

- UNCITRAL – the Model Bill on Electronic Trade
- UNCITRAL – the Model Bill on International Funds Transfer
- UNCITRAL – the Model Bill on Electronic Signatures
- EDIFACT – ECE Standards
- Uniform Rules and Practice of the ICC on Documentary Letters of Credit
- ICC Rules for Electronic Bills of Lading

The EU has dedicated a large number of Directives to eBusiness. They can be roughly divided into three areas: ICT regulation, eBusiness and intellectual property. These documents have already been listed, and their content analyzed. 4 The legal philosophy that results from this regulation is the horizontal unification.

As opposed to the approach of other international organizations, the characteristics of harmonization of state law that the EU insists upon are: obligation, prescribing minimum common content, horizontal action, freedom of choice of harmonization methods and the

[4] Consult: "Legal Infrastructure of the Information Society" in "Infrastructure for Information Society", UNDP B&H, Sarajevo 2003, p. 13 – 19.

possibility for legal subjects to apply the directives. The EU regulation shall be used as the basic form for the BIH eLegislation.

Therefore, there is no need to list and present it here in more detail.

It is interesting to mention that the EU either has not given up the application of the soft law technique in this area. A major example of that kind is the European EDI Agreement, that represents the recommendation of the EC on the regulation of the electronic data exchange.

The legislation of the neighboring countries has a special significance to us for two reasons. It is with these countries that we have a similar historic, technological and cultural heritage. Secondly, the already adopted basic regulation, relevant to the information society, suggest possible directions for the BIH legislation. In that sense, the laws on eBusiness of the Republic of Slovenia, the Republic of Croatia and Serbia and Montenegro are especially interesting.

The analysis of the state of this area allows the presentation of opinions on the general trends in the development of the BIH information society. This, of course, has to be done with the limitations imposed by a general approach such as this one.

Firstly, the technical and technological basis for the development of the information society in BIH have been established. This observation does not exclude, but presumes the demand for further dynamic advancement of the infrastructure in this domain.

Secondly, the organizations that shall be the generators of the general development of the information society have been established and perform their activities: the Council of Ministers and entity governments, individual ministries, the Ministry of Civil Affairs of BIH and entity Internal Affairs Ministries, Ministries of Finance and of Justice especially, the Central Bank of BIH, the Institute for Standards, Measurements and Patents, the entity Registrars of Securities, OHR, UNDP, WB, SEED, and other.

The characteristics of the institutional system are the following: equal presence of domestic and international subjects, sector approach and poor connections.

This state clearly shows that the prerequisites for the creation of a subject that would have a regulatory and coordination role are present.

Thirdly, the era of eLegislation has already begun. This activity so far shares the destiny of an institutional organization. The most important legislation has already been adopted.[5]

In addition to the existing, there are two more trends in the new legislation:

- New regulation that has no direct reference to the electronic communication and eBusiness take into consideration the demands of the IC technologies, and
- New legislation is adjusted to world trends in the application of the ICT, and especially to the demands of the EU Directives; quiet harmonization of BIH law with the requests of the EU has already begun.

Fourthly, BIH is at the beginning of defining its strategy for information society. Two papers carry a special importance in that sense:

[5] The Law on Telecommunication, the Law on Free Access to Information in B&H ("Official Gazette of B&H", No. 28/00), the Law on Copyright and Related Rights in B&H ("Official Gazette of B&H", No. 7/02), the Law on Industrial Property in B&H ("Official Gazette of B&H", No. 3/02), the Law on Electronic Business and Electronic Signature in the Republic of Srpska, and the Law on Consumer Protection of B&H ("Official Gazette of B&H", No. 17/02), with special attention to the following chapters: III. Product Declaration, VIII. Product and Services Advertising and XII. Distance Sale.

- "Telecommunication Sector Policy" ("Official Gazette of the Federation of BIH", No. 10/01)[6], and
- "BIH Policy for Development of Information Society", that the UNDP and the Council of Ministers prepared for the adoption by the Council of Ministers of BIH, in 2004, after the ICT Forum.

Both papers represent major benchmarks to the future eLegislation.

1.3. DEFINITION OF ELEGISLATION

eLEGISLATION is an extremely wide concept. It penetrates all the spheres of the society and the legal system. That is why its definition has to be a general one.

eLegislation relates to normative regulation of specificities that the application of the ICT causes in individual legal institutes and branches.

The wide spread of the ICT gives a general systemic character to eLegislation. Namely, it cannot be limited to a definite number of solutions. Demands of the eLegislation must become the spirit of the entire legal system. This shall also require the creation of a single set of principles on which the new legislation shall be based.

The content of the eLegislation must encompass all the segments of the system. By following the present logic, there are certain areas that can be singled out.

Before everything else, the institutions of the information society need to be established and/or regulated (the verifier, the certification body, the owner of the electronic certificate, Information Society Agency, etc.). The second segment is represented by the material and legal institutes of the existing branches. Those are, before all other, the debenture law (electronic signature, termination of a "long distance" contract, influence of the ICT on determining collision norms, etc.) and the intellectual property law (material form of the author's work, data base, first publication of a work, etc.). Procedural law represents the third significant part of the eLegislation. One of its major characteristics is that it is exposed to changes equally, in all the crucial areas (civil procedure and executive actions, criminal procedure, administrative procedure). Existing research leads to the conclusion that the harmonization is going to be most extensive in this part of eLegislation. Finally, the fourth part of the eLegislation relates to the criminal law. In includes not only introduction of new criminal acts in the legal system, but also the review of entire area of offence.

The penal policy has to be redefined in both areas.

1.4. THE DEVELOPMENT CHARACTER OF THE ELEGISLATION

The information revolution cannot tolerate even a short-term legal vacuum, unlike some other vital changes. In case that the gaps should appear, they are filled by the businessmen themselves, creation the soft law, or in other organized methods (e.g. "BAM Card"). If not, the space is left open for abuse. The danger of abuse in this case is far greater than previously, because the illegal actions may immediately produce negative consequences at the global level. On the other hand, the regulation of the ICT application has distinct favorable effects. That is its propulsive strength and synergy.

The developmental role of the ICT is multiple. It should, above all, enable free perception and advancement of the world achievements, not only in the area of the ICT, but also in the creation of the information society.

[6] This document is of a state nature, and is published in official gazettes of both entities and the state of B&H.

That is why eLegislation serves as a prerequisite for the development and overcoming the drawback to which BIH, due to historic reasons, was exposed.

The other, more concrete result of the development of the eLegislation should be the perception of the solutions recognized worldwide and especially in the EU. In addition to economic advantages, this outcome has also positive political consequences: swift approach to the EU and to becoming a WTO member.

The third, but not least important result of the eLegislation development shall be strengthening of a single economic space in BIH. The global range of the ICT and the universal character of eBusiness may render the entity and other partial markets, e.g. the Brčko District, expensive and superfluous.

Finally, in this modern world, only a regulated application of the ICT and solid, established information society can ensure a better, more humane life to individuals. eLegislation is, therefore, a necessary instrument in that process.

2. CURRENT STATE IN BOSNIA AND HERZEGOVINA

2.1. SPECIFITIES OF BIH LEGAL SYSTEM

The existing framework of the BIH ministries' authorities[7] still provides a sufficient basis for decision-making and the work of common institutions of BIH. This is a positive aspect of the situation since it is expected that the authority of common institutions of BIH is to spread further, over various areas of society and economy.

It is reasonable to suppose that, in close future, there will be a greater degree of cooperation between the Council of Ministers of BIH, executive and legislative bodies of the Federation of Bosnia and Herzegovina and the Republic of Srpska, and vice versa. The environment demands are, among other, directed at more efficient functioning of the government institutions at all levels of the state. One of basic prerequisites to realize this demand is to reduce the decision-making level, both in the legislative, and in administrative area.

Bosnia and Herzegovina, a space limited in the geographical, economic, business, population and migration sense, cannot withstand the existence of legislative authorities at the following levels of state organization: the state, entities and ten cantons within the Federation of BIH. This causes the existence of laws at various levels: canton, entity, state and special top laws, that are the common basis for entity laws in certain areas.

Overcoming this problem is conditioned by the demand for accessing the regional economic and other integration. The only way is to strengthen the legal authority at the state level. This is especially true of the area of the ICT use, considering that its common use cannot tolerate such barriers.

Constitutional authority for state legislation, as material authority, is incorporated in the following Articles of BIH Constitution: Article III.1 of the Constitution "Jurisdiction of BIH Institutions"; Article III.5 of the Constitution "Additional Authority", while the procedure authority is incorporated in Article IV.4 "Parliament – Authorities".

Adoption of state regulation became especially current in 2002, when many B6H laws, material to this area, were adopted.[8] We also need to mention the positive regulation that

[7] Consult Article 5-8 of the Law on the Council of Ministers of B&H.

[8] The Law on International and Inter-entity Road Transport ("Official Gazette of Bosnia and Herzegovina", No. 1/00); the Law on Free Zones in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 3/02); the Law on Industrial Property in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 3/00); the Law on Copyright and Similar Rights in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 7/00); the Law on Transmitting, Regulator and Operator of the Electric Power System in Bosnia and Herzegovina("Official Gazette of Bosnia and Herzegovina", No. 12/00); The Law on Public Service in the Institutions of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 12/00); the Law on the Basis of the Broadcasting System and on the Public Broadcasting Service in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 13/00), the Law on Consumer Protection in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 17/02); the Law on Concessions in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 32/02); the Law on Free Access to Information in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 28/00); the Law on Central Records and the Exchange of Data ("Official Gazette of Bosnia and Herzegovina", No. 32/01); the Law on the Agency for Intelligence and Protection of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 15/02); The Law on Statistics of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 34/02); the Law on the Establishment of the Institute for Standards, Measurements and Intellectual Property ("Official Gazette of Bosnia and Herzegovina", No. 51/02); the Law on Competition ("Official Gazette of Bosnia and Herzegovina", No. 30/01); the Law on Communications ("Official Gazette of Bosnia

relate to the ICT issue, and the need for introducing databases and the application of information technologies in various areas of activity and life. This is, above all, the regulation that relates to the protection of the copyright and related rights, the rights to industrial property, as well as legal regulation that relates to the protection of consumers in which we, for the first time, come across the use of eMoney and distance trade.

In addition to the listed regulation – laws, there are a number of by-laws and legislation at the level of BIH, adopted and passed by the Council of Ministers, in the function of implementation acts in relation to the listed laws. The Constitution of BIH and the Law on the Council of Ministers occupy a special place in the basic legal framework. This law, as such, serves as the ground for all other listed laws adopted at the level of BIH.

2.1.1. LEGAL BASIS FOR COMMON LEGISLATION

The first and ultimate legal basis for common legislation at the level of BIH is the BIH Constitution from 1995, as a component of the Dayton Peace Agreement. Article III.1 of the BIH Constitution prescribes that the following issues are under the jurisdiction of BIH institutions: foreign affairs, foreign trade policy, customs policy, monetary policy, funding of institutions and payment of international debt of BIH, immigration, refugees and asylum, realization of international and inter-entity policy, establishing and functioning of common and international communications, regulation of inter-entity transport and air traffic control.

Item 5 of Article III of the BIH Constitution envisages the additional jurisdiction with the aim of preserving the sovereignty, territorial integrity, political independence and international subjectivity of BIH. at the same time, Paragraph 2 thereof envisages including other issues in the jurisdiction of BIH institutions, such as using electric power resources and common economic projects.

In relation to procedural authority, the Parliament of Bosnia and Herzegovina is authorized by Article IV.4 to pass laws in relation to the realization of the decisions of the Presidency of BIH or the decisions from its jurisdiction, pursuant to the Constitution of BIH. The High Representative has separate authority in relation to the realization of his legislative authority.

2.2. EU INTEGRATIONS DIRECTORATE

The EU Integrations Directorate is a major new institution, introduced by the Law on the Council of Ministers of BIH (Article 23 of the Law), that performs the activities in relation to the harmonization of activities of BIH authorities, participates in the activities on drafting and proposing policies, laws, other regulation and guidelines in relation to activities that BIH is obliged to take in order to join the European integration processes.

In addition to that, the Directorate also performs the activities that relate to starting initiatives and counseling on the issues of harmonizing major procedures and activities of BIH authorities in meeting their obligations towards European integrations.

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and Herzegovina", No. 33/02); the Law on Air Force in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 32/02), and the Law on the Council of Ministers ("Official Gazette of Bosnia and Herzegovina", No. 38/02). There are several other major laws: the Law on the Policy of Direct Foreign Investments in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 1/97); the Law on Foreign Trade Policy ("Official Gazette of Bosnia and Herzegovina", No. 7/98), and the Law on the Customs Policy of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 21/98).

A suitable level of international cooperation has been prescribed by a special piece of legislation, the Law on Ministries and other Authorities of Bosnia and Herzegovina[9], for each of the ministries, within their authority.

So, the Ministry of Foreign Affairs, among other, has the obligation to cooperate with international organizations and monitor the state and development of international relations of BIH with other countries, international organizations and other subjects of the international public law.

The Ministry of Foreign Trade and Economic Relations is authorized for relations with international organizations and institutions in the area of foreign trade and economic relations.

The Ministry of Finance and Treasury is in charge of relations with international financial institutions, and the Ministry for Human Rights and Refugees is in charge of monitoring and implementation of international conventions and other documents from the area of human rights and elementary liberties.

The Ministry of Justice of BIH has the obligation to ensure that BIH legislation and its implementation at all levels is in accordance with the obligations of BIH resulting from international agreements.

The authority of the European Integrations Directorate is closely defined by this law, and includes the coordination of activities that relate to harmonization of the legal system of BIH with the standards of joining the European Union (communitarian law). Also, the verification of harmonization of all the draft laws delivered to the Council of Ministers by ministries and administrative bodies with the Directives from the White Book (preparations of associated countries of Central and East Europe for the integration in the internal Union market), and procedures for meeting the requirements of relevant Directives.

There is also the obligation to coordinate the activities of the administrative bodies and institutions of BIH that are necessary for European integration processes. The Directorate, as a technical operative body, is in charge of contacts with the European Commission.

The European Integrations Directorate is in charge of the coordination of implementation of decisions made by the authorities and institutions of BIH, entities and Brčko District in relation to all the activities necessary for European integrations. The Directorate also has the obligation to participate in activities on drafting laws, other regulation and guidelines in relation to activities that BIH is obliged to take over in the process of joining the European integrations; it serves as the main operative partner of European Commission institutions, in the process of stabilization and association, as well as in coordination of the EC assistance to BIH.

On the basis of the above said, we can see that this regulation completes the entire legal framework in relation to the introduction of the obligation to harmonize the legislation of BIH with the requests of the international community. It is clear that the basic prerequisite for the implementation of this procedure is to pass common regulation at the level of BIH, as well as to harmonize the entity regulation.

2.3. CURRENT STATE OF ELEGISLATION IN THE LEGAL SYSTEM OF BOSNIA AND HERZEGOVINA

The existing legal framework in the legal system of BIH is incomplete and insufficient to initiate the mass application of the ICT in the near future. Establishing an adequate legal

[9] Official Gazette of Bosnia and Herzegovina, No. 5/03.

framework for the eLegislation at the state level is the basic prerequisite to achieve the goal of entering the information society.[10]

The entity regulation is another topic, because only in the RS there is a Law on Electronic Business and Electronic Signature.[11] There is also the issue of reality of the existence of this law and its scope at the current level of the computer structure and the capability of authorities and companies to apply it.

This remark also relates to the Federation of BIH, that has not begun dealing with this issue. In the Federation of BIH there is also the problem of implementation of the regulation that demands the application of the ICT.[12]

We might also discuss the regulation that directly demands the use of the ICT, as the condition for its application, and those in which it is understood that the authorities and companies use the ICT in everyday activities.

In that sense, the Law on Business Companies of the Federation of BIH[13] prescribes that the shares are issued in the electronic form, and must be registered with the Registrar of Securities. This, however, was not directly implemented by the Law on the Registrar of Securities.[14] This even more stipulates the obligation to use the ICT in the area of keeping records and changes on certain securities.

In the listed state and entity regulation, only the Law on Registered Mortgages on Movables and Member Shares in the Federation of Bosnia and Herzegovina demands the introduction of a central database with the Federal Ministry of Justice (Articles 36-38).

[10] The most important regulation that demand the use of the ICT is: the Law on Free Access to Information, the Law on Central Records and Exchange of Data, the Law on Consumer Protection in Bosnia and Herzegovina, the Law on Industrial Property in Bosnia and Herzegovina, the Law on Copyrights and Related Rights in Bosnia and Herzegovina, the Law on Statistics of Bosnia and Herzegovina, the Law on the Intelligence and Protection Agency of Bosnia and Herzegovina, the Law on Establishing the Institute for Standards, Measurements and Intellectual Property, the Law on Communications of Bosnia and Herzegovina and the Law on Competition. There are two by-laws, i.e. decisions of the Central Bank of Bosnia and Herzegovina that need to be mentioned: the Decision on the Minimum Requirements for a Qualified Certification Body that Issues Qualified Certificates for Electronic Signature and the Decision on the Regulation of Rules for the Prescribing Elements for Validity of Electronic Signature ("Official Gazette of Bosnia and Herzegovina", No. 10/02). We should also add the Decision on the Procedure of Signing and Execution of International Contracts ("Official Gazette of Bosnia and Herzegovina", No. 4/00).

[11] Official Gazette of the Republic of Srpska, No. 36/02

[12] The Law on Registered Mortgages on Movables and Member Shares ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 17/02), the Law on Archive Material of the Federation of Bosnia and Herzegovina ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 45/02), the Law on Free Access to Information in the Federation of Bosnia and Herzegovina ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 31/01), the Law on the Banking Agency of the Federation of Bosnia and Herzegovina ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 9/96), the Law on Intelligence and Security Agency of the Federation of Bosnia and Herzegovina ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 23/02), the Law on Land Register of the Federation of Bosnia and Herzegovina ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 19/03). We might also speak about the regulation that directly demands the use of the ICT, as the condition for its application, and those in which it is understood that the authorities and companies use the ICT in everyday activities. In that sense, in the Law on Business Companies of the Federation of B&H ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 23/99, 45/00, 2 and 6/02, and 29/03) it is prescribed that the shares are issued in the electronic form, and must be registered with the Registrar of Securities. This, however, was not directly implemented by the Law on the Registrar of Securities ("Official Gazette of the Federation of Bosnia and Herzegovina", No. 39/98).

[13] Official Gazette of the Federation of Bosnia and Herzegovina, No. 23/99, 45/00, 2 and 6/02, and 29/03.

[14] Official Gazette of the Federation of Bosnia and Herzegovina, No. 39/98.

The state of the ICT use is vividly depicted by the fact that the application of this law has been postponed twice for a year. Its implementation should have started on April 17, 2004, but even at this time there are not even the minimum conditions for that, so that a new postponement is to be expected. There is other, unrelated, regulation, such as the Law on Consumer Protection in Bosnia and Herzegovina that introduces the concept of electronic means of payment, but their application is not mandatory. We can conclude from that that the existence of positive regulation is not sufficient for the application of the ICT, if there are no adequate material conditions.

The legal framework for eLegislation does not exist at any level of state organization in BIH. There are only legal acts and by-laws for some areas of activity (e.g. the banking sector), which is absolutely insufficient. The ICT use aspects are only one segment of eLegislation. eLegislation shall have to be established as a special pillar for the needs of the information society. It should set a consistent legal framework at the state level, as a prerequisite for the implementation of all five pillars, which will introduce us to the information society in future.

3. VISION OF THE NEW STATE

The vision of the new state needs to include all the goals that are related to all seven development pillars of society set in the "Policy of the Information Society Development in Bosnia and Herzegovina". Those goals can be divided into two groups. The first group relates to the general state of legislation in BIH, while the second group relates to the state of eLegislation in the same environment.

The first category of values should provide answers to the second question, namely that of the state of eLegislation in Bosnia and Herzegovina. Depending on the future solutions at the state level, the planned project goals will be realized. The transfer of authority in the constitutional and legislative sense to the state level, in the amount greater than currently, shall influence the realization of all the listed goals. The vision of the new state should present a direction towards the realization of the legislative authority, as much as possible, to the state level, considering the entity specificities.

3.1. General Vision of the New State of Legislation

A general vision of the state of legislation is the vision of legislation that shall be a product of successful harmonization of entity legislations, since the trends in economy and other areas cannot tolerate the existing barriers. This is also the legislation that shall be harmonized with the communitarian law of the EC and the legal regulation of that exists at the level of individual international organizations with the UN (e.g. UNCITRAL), as well as individual professional organizations.

3.2. Vision of the New State of eLegislation and Necessary Changes within the Existing Legal System of Bosnia And Herzegovina

A general vision of the state of legislation is nothing more but consistent application of the existing project solutions, since the current state of eLegislation does not provide even the basic conditions for the statement that this area is legally charted and regulated. Consistent application of project solutions represents also the vision of the new state of eLegislation. Passing the described legal acts and by-laws listed in Chapter 7 hereof, is only one of the prerequisites of the new state of eLegislation. Adequate monitoring, user training, establishing an adequate organization authority at the state and perhaps entity levels are additional conditions. Establishing the stated separate authority will appear as mandatory requirement if we want to realize the planned project goals.

The inevitable changes to the legal system of BIH have already been described in Items 3 and 7 hereof. They are:

- defining the legislation at the state level
- defining entity legislation
- harmonization of entity legislation
- reduction of the decision-making level, adopting the regulation in accordance with Chapter 7 hereof
- harmonization of the existing regulation from Chapter 7 with the new eLegislation
- establishing the organization authority for education, monitoring and all
- other post-project activities.

3.3. Essential Steps Towards the New State of eLegislation

What steps need to be taken towards the new state of eLegislation? Finalization of the existing project activities in relation to the strategy and the action plan, namely the following: ICT Infrastructure, ICT Industry, eEducation, eGovernment, and eLegislation,

as the legal framework for the previous project activities. All these steps are directed towards the creation of a basis for the entrance into the information society in a relatively short period of time. The actual steps towards the new state of the eLegislation can technically be expressed through various types of diagrams, to determine the time limits for the project. Basically, they can be divided into the following stages in the period of realization of the eLegislation project:

- drawing up new regulation
- monitoring and education.

The post-project period would encompass the following stages:

- implementation
- permanent monitoring and education.

Time specifics have already been set by the Project, and the first stage should be finished by end 2005. The second stage should occur at the same time as the finalization of the entire process, project and other activities in the accession to the information society.

4. STRATEGY GUIDELINES

4.1. GENERAL ACTIVITY DIRECTIONS

If Bosnia and Herzegovina intends to become an EC member, then it has to harmonize its regulation with the EC regulation. This is why EC Directives should serve as the basic pattern for BIH eLegislation.

4.2. ELEGISLATION STRUCTURE

4.2.1. EBUSINESS

4.2.1.1. THE STRUCTURE OF LAWS THAT SHOULD BE DRAWN UP – ADOPTED

The Law on Electronic Business Activities should be the basic legal act in the area of eLegislation that shall contain the trade activities and the content of eCommerce.

The Law on Electronic Signature should enable successful functioning of electronic business. This law has to regulate the electronic signature and provide equal legal force of proof to the electronic documents and hardcopy documents, which is one of the basic reasons behind the adoption of this law. The reliability of electronic business is guaranteed by a qualified electronic signature, that ensures the integrity and validity of data, as well as the identification of the signer.[15]

The Law on the Certification Body has to relate to the organization of the certification body. This body has to be placed at the state level, as an integral part of an existing ministry, a separate authority.

4.2.1.2. THE STRUCTURE OF THE BY-LAWS THAT SHOULD BE DRAWN UP – ADOPTED

- The Ordinance on the measures and actions of use and protection of the electronic signature and advanced electronic signature, the means for making the electronic signature and advanced electronic signature and the certification system and mandatory insurance of the qualified certificates issuance service provider;
- The Ordinance on the technical rules and conditions of connecting the electronic signature certification systems;
- The Ordinance on the registry of electronic signature certification service providers that issue qualified certificates;
- The Ordinance on the records of electronic signature certification service providers.

4.2.2. EEDUCATION

Bosnia and Herzegovina is a country with two entities and one district. In addition to that, there are 10 cantons in the Federation of Bosnia and Herzegovina, with their separate legislations. The existing education system is undergoing transition. The Education Reform Strategy is being implemented. The OSCE Mission is the coordinator of the activities in the preparation and implementation of the Strategy on behalf of the international community. The aims of the Strategy are: access to

[15] Special attention needs to be paid to the fact that the EC has passed the Guidelines on Electronic Signature, that determines the obligation of the EU members to regulate the issue of electronic signature in the national legislation by June 30, 2001. Consult: "Papers and Studies of the Split Law School", Electronic Signature, Ljiljana Maurović, Split, September 2001, p. 79-80.

education and non-discrimination, improvement of the curriculum, teacher training, professional education, university education, finance and legislation.

The basic aim is for the education system to promote and ensure general computer literacy of the population. The existing computer science syllabuses need to be improved and one ones should be introduced in primary and secondary education, as well as the university level.

4.2.2.1. THE LAWS THAT SHOULD BE DRAWN UP – ADOPTED

- The Law on University Education
- The Law on Scientific and Research Activity
- The Law on Textbooks
- The Law on Secondary Trade and Technical Schools
- The Law on Permanent Education
- As well as the corrections to the legislation on the customs and taxes on purchasing equipment and software by educational institutions, as incentives to the purchases.

It is a positive thing that there already exists the Law on Pre-school, Primary, and General Secondary Education, and the Law on Copyright.

4.2.2.2. THE BY-LAWS THAT SHOULD BE DRAWN UP – ADOPTED

- The Ordinance on Public Procurement
- The Ministry of Education needs to be established at the state level as soon as possible.

4.2.3. ICT INFRASTRUCTURE

Significant improvement has been achieved lately in this area, with regard to the legislation. The policy in the area of telecommunication has already foreseen many solutions for the future regulation of the telecommunication market. However, there are also several documents missing in this area, e.g. the computerization strategy. One other unanswered question (even though the regulator defined the ISP as a business subject that provides telecommunication services) is that whether the ISP is a telecom-operator, and if so, by what definition or principle. (Also, if there is a difference in the definitions of the telecom-operators, such as BIH-Telecom, HT- or RS-Telecom, on one hand, or a cable or ISP operator, on the other).

Major existing laws in this area are:

- The Law on Telecommunication ("Official Gazette of Bosnia and Herzegovina", No. 2/24)
- The Law on Free Access to Information in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 28/00)
- The Law on Copyright and Related Rights in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 7/02)
- The Law on Industrial Property in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 3/02)
- The Law on Consumer Protection in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 17/02).

4.2.4. EGOVERNMENT

The transformation of management on the basis of application of ICT (eGovernment) will ensure approaching of the management and public services to the needs of

citizens, business systems and NGOs, and increase the efficiency of work and quality of services of the management, with the reduction of costs. The legislation in relation to public management needs, above all, to promote new resolutions with consistent realization of the principles of de-politicization, transparency, professionalism, and efficiency of its work. In order to initiate the reform of the public management, there has to be present the greatest possible degree of support of all the relevant political subjects in Bosnia and Herzegovina. The decentralization needs to be achieved from the entity and canton level to the local level, in relation to all the state bodies that citizens come into direct contact with. It is necessary to execute the reform of the local management and introduce the eGovernment, and to establish the computer system of the eMunicipality, as well as to perform the standardization, organization and systematization thereof.

4.2.4.1. THE LAWS THAT SHOULD BE DRAWN UP – ADOPTED

- The Law on State Registrars (which can be divided into civil, security and economy ones)
- The Law on the Protection of Personal Data
- The Law on Central Records and the Exchange of Data

4.2.5. ICT INDUSTRY

The information society development is followed by the industrialization in the area of the ICT, especially in the domain of software industry, through the private and public sector. It is especially necessary to stimulate the development of small and medium enterprises in the private sector, their production and business connections with the public sector and possible exports. The Council of Ministers of BIH, as well as the entity governments must use their decisions to influence the creation of an environment that is favorable to the development of the industry of information and communication technologies, with intensive use of resources in relation to staff, space, geographic location, and other opportunities in BIH. However, the analysis of planned government stimulating measures point out the need to pass, modify and harmonize individual laws and regulation with the aim of realization of planned measures to stimulate the development of the ICT industry in BIH. This is especially true of the legislation and regulation in relation to: customs, taxes, finance, domestic and international trade, eBusiness, etc. A better and necessary environment for the development of the ICT industry would be achieved by the realization of the activities in relation to the legislation and regulation.

The most important existing laws in this area are:

- The Law on the Establishment of the Institute for Standards, Measurements and Intellectual Property of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 19/01), and
- The Law on Standardization of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 19/01).

4.3. SPECIFIC DIRECTIONS OF ACTION

Special directions of action can be divided into the following segments:

- Adopt changes and amendments to the listed state and entity laws
- Adopt changes and amendments to the listed by-law
- Establish the Society Computerization Agency
- Follow the EU Directives in drafting new regulation.

4.4. IMPLEMENTATION RISK FACTORS

Possible risks are: a very poor political environment, the existence of three levels of legislature plus the Brčko District as a separate legislature level, absence of a sufficient quantity of information on the usefulness of introducing new technologies to the infrastructure, education, management, health care system, industry, business; relatively undeveloped telecommunication infrastructure, lack of capital, a small number of Internet users, a low level of computer literacy, political environment, opposition of entities to passing laws and by-laws at the state level.

4.5. ACTIVITY DIRECTIONS

Passing eLegislation as a prerequisite for the development of BIH economy.

Transform the government on the basis of the application of information and communication technologies, establish eGovernment that will provide for the closer contact of the government and public services to the needs of citizens and NGOs, and increase the efficiency of work and the quality of government services with the reduction of costs.

Create the information system of eMunicipality and information systems for the standardization, organization and systematization.

It is necessary to stimulate the development of small and medium enterprises in the private sector, connections of their production and businesses with the public sector and possible exports.

Provide the environment favorable to the development of the ICT industry, with more intensive use of staff, space, geographic location and other resources in BIH.

Introduce stimulating measures by amending the regulation in relation to: customs, taxes, finance, domestic and international trade, eBusiness, etc.

5. PROJECT TASKS – A REVIEW

5.1. A REVIEW OF PROJECT ACTIVITIES

The aim of project activities in relation to eLegislation is the creation of a new, and review of the existing legislation related to the ICT in BIH. the creation of new, and a review of the existing legislation necessary for the application of the ICT in BIH is presented in three projects:

- Legislation for eBusiness (Project 1)
- Legislation for eEducation and eGovernment (Project 2)
- Legislation for the ICT Infrastructure and ICT Industry (Project 3)

5.2. PROJECTS

5.2.1. PROJECT 1 (LEGISLATION FOR EBUSINESS)

Activity 1. A team of local experts will review and analyze the legislation of the international organization in this area, review the relevant EC documents, the state of legislation in developed countries and the state of regulation in BIH. on the basis of that information, they will prepare a description of the desired state in BIH in this area, while identifying the deficiency of the current state. (The deadline for this project stage is the summer of 2004).

Aim 1. Perform the review of necessary legislation in BIH and identify the deficiency in the existing legislation.

Activity 2. Based on the analysis of the international regulation in this area, and especially of the relevant EC documents, the team of local experts will review the existing and prepare the first draft of the new legislation. (The deadline for this stage of the Project is the end of 2004).

Aim 2. Prepare the first draft of the reviewed of new legislation.

Activity 3. Submit the first draft of the reviewed or new legislation for a public debate, that will include: a public debate open to all subjects, a public debate to which experts from the areas covered by the legislation will be invited, a public debate to which the representatives of the international community in BIH will be invited. (The deadline for this stage of the Project is January 1, 2005 – March 1, 2005).

Aim 3. Documenting the findings from the reports from the public debates on the draft of the legislation.

Activity 4. On the basis of the information gathered from the public debates and its analysis, the legislation draft shall be reviewed in the way considered adequate and suitable, with the aim of its more efficient adoption by the legislative body and its simpler implementation. (The deadline for this stage of the Project is the spring of 2005).

Aim 4. The final draft of the legislation based on the previous consultation procedures.

Activity 5. Approval of the final draft of legislation by the adequate legislative authority. (The precise deadline is not under control of the Project.).

Aim 5. Approval of the legislation draft by the legislative authority.

Priorities

Priority tasks of the Project: Legislation for eBusiness are the adoption of the legislation, i.e. the following:

- The Law on Electronic Business of Bosnia and Herzegovina
- The Law on Electronic Signature of Bosnia and Herzegovina
- The Law on the Certification Body of Bosnia and Herzegovina
- The Ordinance on the measures and actions of use and protection of the electronic signature and advanced electronic signature, the means for making the electronic signature and advanced electronic signature and the certification system and mandatory insurance of the qualified certificates issuance service provider;
- The Ordinance on the technical rules and conditions of connecting the electronic signature certification systems;
- The Ordinance on the registry of electronic signature certification service providers that issue qualified certificates;
- The Ordinance on the records of electronic signature certification service providers.

5.2.2. PROJECT 2 (LEGISLATION FOR EDUCATION AND GOVERNMENT)

Activity 1. A team of local experts will review and analyze the legislation of the international organization in this area, review the relevant EC documents, the state of legislation in developed countries and the state of regulation in BIH. on the basis of that information, they will prepare a description of the desired state in BIH in this area, while identifying the deficiency of the current state. (The deadline for this project stage is one month).

Aim 1. Perform the review of necessary legislation in BIH and identify the deficiency in the existing legislation.

Activity 2. Based on the analysis of the international regulation in this area, and especially of the relevant EC documents, the team of local experts will review the existing and prepare the first draft of the new legislation. (The deadline for this stage of the Project is four months).

Aim 2. Prepare the first draft of the reviewed of new legislation.

Activity 3. Submit the first draft of the reviewed or new legislation for a public debate, that will include: a public debate open to all subjects, a public debate to which experts from the areas covered by the legislation will be invited, a public debate to which the representatives of the international community in BIH will be invited. (The deadline for this stage of the Project is three months).

Aim 3. Documenting the findings from the reports from the public debates on the draft of the legislation.

Activity 4. On the basis of the information gathered from the public debates and its analysis, the legislation draft shall be reviewed in the way considered adequate and suitable, with the aim of its more efficient adoption by the legislative body and its simpler implementation. (The deadline for this stage of the Project is one month).

Aim 4. The final draft of the legislation based on the previous consultation procedures.

Activity 5. Approval of the final draft of legislation by the adequate legislative authority. (The precise deadline is not under control of the Project.).

Aim 5. Approval of the legislation draft by the legislative authority.

5.2.3. PROJECT 3 (LEGISLATION FOR THE ICT INFRASTRUCTURE AND ICT INDUSTRY)

Activity 1. A team of local experts will review and analyze the legislation of the international organization in this area, review the relevant EC documents, the state of legislation in developed countries and the state of regulation in BIH. on the basis of that information, they will prepare a description of the desired state in BIH in this area, while identifying the deficiency of the current state. (The deadline for this project stage is one month).

Aim 1. Perform the review of necessary legislation in BIH and identify the deficiency in the existing legislation.

Activity 2. Based on the analysis of the international regulation in this area, and especially of the relevant EC documents, the team of local experts will review the existing and prepare the first draft of the new legislation. (The deadline for this stage of the Project is four months).

Aim 2. Prepare the first draft of the reviewed of new legislation.

Activity 3. Submit the first draft of the reviewed or new legislation for a public debate, that will include: a public debate open to all subjects, a public debate to which experts from the areas covered by the legislation will be invited, a public debate to which the representatives of the international community in BIH will be invited. (The deadline for this stage of the Project is three months).

Aim 3. Documenting the findings from the reports from the public debates on the draft of the legislation.

Activity 4. On the basis of the information gathered from the public debates and its analysis, the legislation draft shall be reviewed in the way considered adequate and suitable, with the aim of its more efficient adoption by the legislative body and its simpler implementation. (The deadline for this stage of the Project is one month).

Aim 4. The final draft of the legislation based on the previous consultation procedures.

Activity 5. Approval of the final draft of legislation by the adequate legislative authority. (The precise deadline is not under control of the Project.).

Aim 5. Approval of the legislation draft by the legislative authority.

5.3. IMPLEMENTATION SUBJECTS

- The Council of Ministers of Bosnia and Herzegovina
- Entity governments
- Relevant Ministries of entities and BIH
- Relevant international organizations (OHR, EC Commission).

6. MONITORING AND POST-RISKS

Monitoring will present one of the key problems in relation to eLegislation and the entire Project. As one of the previous conclusion, the need for introducing a special state agency for information society with the monitoring function is apparent. This is mentioned here so that the project activities would not be just empty words. Namely, we are aware of the existence of numerous legal and other documents that are not applied for several reasons. The main causes are: the lack of adequate material basis and support, lack of understanding of the ICT, inadequate educational, age structure in state government, etc.

Also, there are various agencies the functions of which have not been initiated yet due to the listed reasons. For example, the European Integrations Directorate had only one employee for long period of time. The agency with the function of the realization of eLegislation should at least be established before commencing with the project activities, so that it could continue with this function in the post-project period. The timely establishment of this Agency would provide adequate contribution and support to the entire Project, and not only for this portion, but for all five pillars of the Project.

There are other reasons that support this opinion, and one of the basic ones is that the entire problem needs to be set at the state level so that the entire Project could keep such a character, until its very end. Should this issue be set, say, at the level of a state institution, for example the Public Service Agency or the High Court and Prosecution Council, the monitoring and implementation of the entire Project would be limited to only certain pillars of the Project, and the implementation must not leave out the basic segments of a society, such as education, health care and school system.

The limitations would then relate to some of the existing areas of the Project implementation, that would cause a contrary effect – the Project application would only relate to limited areas of its implementation.

This is all mentioned because we cannot avoid the impression that the entire Project is directed towards the existing state structures, and not the basic and fundamental values and pillars of a sound society, that are oriented towards the next generations. Those are, above all, the state and other education systems, all forms of education, health care, etc.

6.1. FORMS OF MONITORING

The forms of monitoring should be various. The monitoring performed at the state level should be separated from the entity level monitoring. This is necessary due to the volume and complexity of the matter, as well as the fact that the entity regulation shall continue to exist in some specific areas.

A basic and general agent of monitoring would be a relevant state authority – an Agency that would delegate this function in accordance with a special program to an institution that is capable of such a function. A confirmation of this claim is the fact that a future state authority in charge of this area cannot possess all the necessary professionals, or ensure adequate technical and other resources.

In relation to the form of monitoring, it should be divided into different locations, or the areas of eLegislation application, but also in accordance with all five pillars of the Project. Those would be the following levels of monitoring:

- Economy,
- Education
- Health care
- Judicature and prosecution

- And all levels of state government.

This list could be longer, but it basically includes all the fundamental functions of a state system. Those are actually “pillars” of a society that has the intention to become a part of an information society in future. In addition to that, the function of education needs to have a place besides the monitoring function. It would be optimal and rational to treat the two together.

6.2. RISKS

The risks can be defined as current and post-risks. Both types of risk are defined by the current state, and the conditions of the implementation of the Project, including all five of its pillars. They can be defined as the following categories of value:

- Current state structure
- Current legislation structure
- Demands of the international community
- Internal political risks
- Political risks of the close environment.

The risks shall be present until the very end of project activities, or until the decision whether to implement the Project at the state level. All the potential future risks will depend on the realization of that part of the Project. Future risks can be closely linked both to the current and future political risks. Basically, the fact is that, notwithstanding the political options, every future form of political rule will have to consider the demands in relation to the need to access the category labeled the information society.

7. THE OVERVIEW OF LAWS THAT NEED TO BE PASSED

7.1. NEW LAWS THAT NEED TO BE PASSED

Passing the new legal regulation is imposed as a necessary step in the creation of the already described legal framework for the needs of the eLegislation. With respect to the existing solutions in relation to the division of the legal matter, it is our opinion that the best solution would be to pass the following new laws, which should serve as a legal basis and framework for the eLegislation, i.e. the following:

- The Law on Electronic Business,
- The Law on Electronic Signature, and
- The Law on the Certification Body.

This choice was made in accordance with the intention to separate the legal matter that would be related to the regulation of material, and regulation of procedural nature. The Law on Electronic Business should serve as the basic legislation for the area of eLegislation, that shall encompass the matter related to eCommerce, as well as other aspects of trade.

Since this matter was not treated in the Law on Debenture, a logical solution is to treat it in a separate piece of legislation. After all, there are similar experiences in comparative legislation.

In relation to the observed environment, there is a tendency to regulate the issues of electronic signature and electronic business in two separate pieces of legislation.

There are several reasons behind the separation of the matter, starting from the technical ones, including the claim that there are different aspects of the issue. The issue of electronic signature, in that sense, seems more of a technical matter, that shall be in relation to the regulation that treats the method of approving and realization of the electronic signature, its verification, certification, keeping adequate records, changes, etc, which is completely opposite from the matter of electronic business.

The separation will lead to the situation in which the by-laws will be in the service of implementation of the piece of legislation that will regulate the matter of electronic signature.

The third separate law should be in relation to the establishment of the certification body. This is a body that needs to be set at the state level, which, in the technical sense, is to be done in the form of legislation at the state level. This should be a separate state body, an authority that would be placed within existing or future ministries with the Council of Ministries of Bosnia and Herzegovina. The legal form is necessary due to constitutional solutions, general acceptance of the function and mission of this institution, budget planning and financing, etc.

7.2. EXISTING LAWS THAT NEED TO BE AMENDED

The legislation that needs to be amended includes all the legislative documents that are related to the application of the ICT, as well as the use and application of the electronic signature and rules related to electronic business operations.

The entity legislation shall present a problem since the list of legislation contains both entity and state laws. The solution should be such that the laws listed in the previous item, that need to be state regulation, cause the obligation for entity legislative authorities to harmonize their legislation in a suitable legal period of time.

The volume of existing legislative documents shall depend on their subjects, and will differ on the case-to-case basis. The following pieces of state legislation demand the harmonization with the new legislation in this area:

- The Law on Competition
- The Law on Industrial Property in Bosnia and Herzegovina
- The Law on Copyright and Related Rights in Bosnia and Herzegovina
- The Law on Consumer Protection in BIH
- The Criminal Code of BIH
- The Law on Resolution of the Conflict of Laws with other Regulation
- The Law on Communications
- The Law on Free Access to Information in BIH
- The Law on Central Records and the Exchange of Data.

The following entity laws need to be harmonized with the new legislation:

- The Law on Debenture
- The Law on Business Companies
- The Law on Securities
- The Law on Stock Exchanges
- The Law on Trade
- The Law on Notaries
- The Law on Banks
- The Law on the System of Insurance of Property and Persons
- The Law on Financial Business Operations
- The Law on the Freedom of Information
- The Law on Executive Action
- The Law on Criminal Action
- The Criminal Code
- The Law on Law Practice
- The Law on Bankruptcy Proceedings
- The Law on Liquidation Proceedings
- The Law on Entry into Court Registrars.

The harmonization shall be necessary also in the case of by-laws from this area, namely the following two decisions of the Central Bank of Bosnia and Herzegovina:

- The Decision on the Minimum Requirements for a Qualified Certification Body that Issues Qualified Certificates for Electronic Signature, and
- The Decision on the Regulation of Rules for the Prescribing Elements for Validity of Electronic Signature.

7.3. THE BY-LAWS THAT NEED TO BE ADOPTED

In addition to the listed legislation that needs to be adopted, there is also the need to adopting several by-laws at the state level of Bosnia and Herzegovina. They should have the function of the implementation of the laws, and a part of the system of a unified technical support to the realization of the entire Project.

These by-laws need to regulate the issue of security of the entire system, as well as of individual procedures, while the major ordinances shall be contained in the listed laws,

and above all, in the Law on Electronic Signature. These are procedural ordinances, related to the authority of certain state and other bodies, the method of their operations and actions, and even blanket criminal actions. Those are the following by-laws:

- The Ordinance on the measures and actions of use and protection of the electronic signature and advanced electronic signature, the means for making the electronic signature and advanced electronic signature and the certification system and mandatory insurance of the qualified certificates issuance service provider;
- The Ordinance on the technical rules and conditions of connecting the electronic signature certification systems;
- The Ordinance on the registry of electronic signature certification service providers that issue qualified certificates;
- The Ordinance on the records of electronic signature certification service providers.

In addition to that, there will also appear the need to pass some entity by-laws. Their number and type shall depend on the regulation that will be set at the state level, as well as the degree of the implementation of the entire Project.

eEducation

Education is now at a historic turning point. Global, networked society, society of knowledge as well as of the economic development based on knowledge, demands necessary changes and adjustments and it gives guidelines to education that provide an answer to the newly created social context.

Changes supported by development of Information and Communication Technologies (ICT) change our reality every day. There is no single segment of human action that is not undergoing changes.

Knowledge paradigm and knowledge perspective have changed entirely. Almost all domains of human action, based on paradigm and perspective of knowledge, received the prefix „electronic"(money, mail, banking, commerce, communications, marketing, etc.)

Following concurrence of unfavorable events, Bosnia and Herzegovina has during the past fifteen years been seriously lagging behind in transformation and adjustment of its resources to the new milieu and in the degree of informatization of the society as a whole. If we want Bosnia and Herzegovina to timely connect itself to the world of developed nations, it is imperative for us to bridge this divide as soon as possible. This makes knowledge paradigm and knowledge perspective the foundation for change.

This also presupposes that Bosnia and Herzegovina must have an effective and efficient education system that will transform our country into a society based on knowledge, built on the development and application of information and communications technologies. At the same time, information and communication technologies are the most vital forces, necessary for changes in the education.

This document present a development strategy application of which should support education component of one new, modern, information society in Bosnia and Herzegovina. In that regard, we see the position of the education system from two perspectives.

First, in the context of living in the information society, the education system must become a service to citizens. Living in the information society requires every citizen to have some so far unknown skills. In such a society, the education system must provide to citizens something more than just basic literacy and traditional knowledge. Apart from introducing into curricula the new knowledge and skills citizens must acquire during their schooling, the education system must transform itself to provide continued supplementation of such skills and knowledge through the concept of life-long learning. Education system's task is to carry out continued promotion and dissemination of knowledge on the information society in different ways and inform of the important of this transformation for BiH development.

Secondly, but not least important, ICT must become a normal, everyday tool in the education system functioning. All education and research institution must have at disposal information and communications equipment that will ensure their modern and efficient functioning. Also, they must, via the BiH national education and research network, be connected to similar European and global networks. Something that is already considered a common situation globally - teachers and researchers have a simple and cheap access to scientific information form any corner of the globe – must become reality in BiH as well. In the modern world, there are no isolated education systems any longer – informatization of our education and research institutions becomes the condition of their existence.

Strategy presented in this document, apart from other concrete measures that need to be undertaken, sends a clear message – development of the information society, as the necessary prerequisite to overall development of Bosnia and Herzegovina, cannot be separated from the redefinition and enhancement of the education system's role in that process.

8. GENERAL OVERVIEW

8.1. FIELD IN FOCUS

We essentially differentiate between two groups of segments Information Society Education Development Strategy must consider. They are:

- Education as service for information society and
- Using information and communications technologies (ICT) in the education system.

8.1.1. EDUCATION AS SERVICE FOR THE INFORMATION SOCIETY

Education system is considered here as service for a modern, information society. What can one education system offer to citizens who live in an information society? We attempted to find answers through the following segments:

- General education for information society (*information science literacy*).
- Dissemination of knowledge about the information society.
- Specialist education for the information society.
- Post-education for information society and life-long learning.
- Scientific and research work.
- Libraries.

Existence of clear and consistent constructs about quality and standardization relevant for topics covered is important for all segments.

8.1.2. USING ICT IN EDUCATION SYSTEM

Use of ICT in education system is considered here in view of improvement of both efficiency and effectiveness of its functioning. ICT can improve the functioning of the education system via the following segments:

- Connection to Internet and research/education networks
- Enhancing computer capacities for teaching, scientific and research work
- Development and use of different forms of electronically supported learning
- Education Management Information Systems (EMIS)
- ICT for libraries

Clear and consistent quality and standardization definitions are equally relevant for these segments.

8.2. ROLE OF EDUCATION IN DEVELOPMENT

Building the information society is not longer the exclusivism of highly developed countries. It is becoming a global process where less developed countries are looking for their opportunity. Appropriate use of ICT can become the development shortcut for developing countries like Bosnia and Herzegovina. Requirement for such development process is building “human resources” as key “digital property”, new category of wealth typical of the post-industrial information society. The first step in that direction is the education of all population groups in use of computers and internet services, i.e. dissemination of “digital literacy”. Quality education system and in that regard, primary and secondary schools, is the starting point of this process.

In a developed information society, human resources represent the main development resource, quality of which is essentially determined by the education. Education should contribute to sustainable national development and lasting development f every individual. That is why education is the national priority in all developed countries. Modern education development strategies are founded in the concept of life-long learning and the concept of “learning society”.

Transformation of the education system for the needs of the information society and use of ICT in education must be placed at the top of the list of political priorities as they are the precondition without which BiH society cannot develop and they are the foundation off admission into European integrations.

Development feature is important in bridging that which is often called the "digital divide" between "owning" and "not owning" information and communication technologies and information.

8.3. TRENDS

8.3.1. NEW EDUCATION FOR NEW SOCIETY

Facts illustrate that classical education and classical 20th century university education was inefficient and inappropriate for the needs of modern and IT-based economy.

Education system should create an environment to incite young people's interest for independent learning (instead of enforcements, emphasise attraction), and teach them to use modern tools and aids, especially those that will facilitate their access to and management of information. Only a better educated individual can easily finds its way around the labor market and adjust himself/herself with job changes and market demands.

On the other hand, the education system demonstrates inefficiency from the aspect of forming new professionals. Causes for such situation should be sought in rigid and outdated curricula and syllabi as well as use of outdated aids in the process of transfer and acquisition of new knowledge.

In developed countries, past is the time when knowledge is transferred solely by use of traditional aids such as blackboard and chalk or even overhead projector. Advanced societies recognized that quality education process, based on the use of advanced aids (ICT technologies first and foremost) represents the driving force of entire community's development. Likewise, the community quickly compensates for investments in education through increase in efficiency of the education system, accumulation of ICT resources and creation of quality human resources that can not only integrate themselves but also lead further technological and other forms of progress in that country. We must respect the fact that the education community educates and shapes individuals whose mission is to apply their knowledge, experiences and habits acquired within that education community in the entire society for the purpose of progress. In that regard, it is very important to provide the education community today with circumstances we would like to see tomorrow in the entire society.

8.3.2. EDUCATION AS SERVICE FOR INFORMATION SOCIETY

Digital technology profoundly changes the way in which people live, work, learn and play. Not so long ago, move from education and professional development to the labor market happened only once in a lifetime with most people. Time has come when many traditional vocations no longer exist. They have been replaced by new ones, requiring appropriate knowledge and skills for which curricula needs to be designed.

The key change taking place is related to the definition of digital literacy. It is significantly expanded and it includes concepts related to the use of digital technologies, communication tools and/or networks for access, management, integration and creation of information aiming to efficiently acquire individual and social deductions in a knowledge-based society.

Concept of life-long learning needs to be emphasized within this context. In the time to come, life-long learning is very much becoming a necessity and one of the elementary strategic references of employment policy. It is also becoming the elementary prerequisite for achieving flexibility in labor market.

Life-long learning is becoming the leading principle in providing education and participating in education in the entire continuum of different learning contexts. In the mentioned EU guidelines, life-long learning is defined as the complete learning cycle, from childhood, formal education at all levels to independent learning in adult life, including distance learning.

It is a common opinion that Library Systems (LS) are very important for information society development. For example, the Glasgow IFLA Declaration pointed out that libraries and information services should support and promote principles of intellectual freedom and provide for undisturbed access to information.

Internet Manifesto, a document IFLA issued in 2002 focused on the fact that undisturbed access to information ([16]) is important for freedom, equality, global understanding and peace, that is the intellectual freedom is the right of every individual to have and to express one's own opinion – the foundation of democracy –to "search for" and "receive" information, while freedom of access to information is the main responsibility of library and IT profession.

As part of the preparatory conference "Libraries at the heart of information society" *Geneva 2003) for the World Information Society Summit (WSIS), together with UNESCO, IFLA sent an invitation to countries of the world to:

"support and expand the existing global networks of libraries and information services in order to preserve knowledge and cultural heritage; to provide information access points and develop basic literacy of the twenty-first century, thus implementing the information society. High quality library and information services provide access to information necessary to social communities they serve. Modest investment in them will soon be returned through significant dividends".

Transformation of education system and general informatization of society could also render impetus to development of specific electronic publishing producing electronic resources in the form of electronic books and magazines, as well as Programs of digitalization of the cultural and historic heritage of Bosnia and Herzegovina. This entails creation of digitalized resources in the form of textual databases or separate digital archives of documents, images or video clips.

8.3.3. USING ICT IN EDUCATION

One of the important indicators of progress in any country is the degree at which this country became a successful and full fledging segment of the global information society. A very significant indicator of its connection to the world is its connection to Internet and research and education networks. This has become one of the important generally accepted indicators of informatization and general progress of any country. In that context, we see a clear trend of creating broadband connection. Broadband access that is expanded and acceptable is of fundamental importance for the information society to achieve its full potential. Broadband access is not just the quickest manner of connecting to Internet but it is also the foundation that should change the way people use internet. Image about Internet is changing from slow textual form unadjusted to the person to the fact picturesque system combining immobile images, video, animation and sound.

In the European Union, it is practically a reality that every student and researcher has access to Internet and research and education networks. What they are trying to achieve now in short-term (in the next two years) is for all of them to have access from home as well. GEANT 2 represents continuation of GEANT project, initiated in 2000 as part of the Fifth Framework EC Program aiming to build a pan-European network for education and

[16] Access to Internet and all its resources must be in accordance and harmonized with Article 19 of the Universal Declaration on Human Rights.

research work in three and a half year's time, by means of national research and education networks (NREN).

Conclusions of the Council of Europe (CoE) Lisabon meeting represent a turning point in the fielf of education for EU countries. Stockholm meeting of the Council of Europe (2001), CoE meeting in Barcelona (2002) elaborated on Lisabon conclusions and confirmed the importance of improvide and effective use of ICT for Euroepan Knowledge Society.

Action plans (Programs eEurope2002 and eEurope2005) set eLearning as the biggest priority, improving goals for infrastructure, equipment and elementary education as preconditisn for integration. eLearning iniiative further develops these goals from an education point of view, stressting on the need for pedagogical standards and goals relating to quality of learning and easy access to eLearning sources and services. Particular attention is paid to combating digital division, and the Council of Europe invited member countries to continue "developing eLearning for all citizens"..

Main objectives set in the eEurope2002 action plan are almost entirely achieved in all EU member countries:

- Most schools have access to Internet and multimedia resources.
- Trans-european networks connect national and research networks. There is ongoing work on their improvement.

eEurope2005 Action Plan is based on two groups of activities that follow each other:

- Encourage services, applications programs and content that cover on-line public service and eBusiness
- Broadband infrastructure and security issues.

Action Plan includes 4 separate but intertwined tools. According to this plan, by 2005, Europe should have: modern Internet public services, e-government services, e-learning services, e-health services, dynamic e-business environment and to provide for:

- Extensively expanded broadband access at price created by market bidding
- secure information infrastructure.

E-learning could have a determining influence on social inclusion, and that is why it is vital part of the life-long learning. In developing of new structures in education systems, EU countries will have to redefine education in the national and the European context, e.g. to change organization-wise from systems oriented to bids to the one oriented to demands, from the one based on institutions to the one based on process.

8.3.4. QUALITY AND STANDARDIZATION ASPECTS

Rapid ICT evolution, stimulated by expansion in application of electronically supported education systems, highlighted the need for standardization. As a result of the process, many international associations and institutions launched initiatives to adopt new standards to get a set of widely accepted international recommendations. Those are, among other things:

- International Organization for Standardization (ISO) founded its own sub-committee for information technology standards in learning, education and training ISO/IEC JTC 1/SC 36).
- Large multinational companies organize parallel but standardizes own system of education (CISCO academies, IBM certificates, Microsoft training centers), even companies outside the ICT domain (Procter & Gamble).

- CEPIS (Council of European Professional Informatics Societies) inaugurated the ECDL, European 'standard' for final user. Similar project, EUCIP, is intended for IT professionals.
- General quality standards are applied to education s well. For example, Latin American countries adopted the international contract on application of ISO 900x:2000 system of quality in education .
- IEEE Computer Society and Association for Computing Machinery (ACM) completed review of Computing Curricula 1991 and issued Computing Curricula 2001 (CC2001). CC2001 contains guidelines and recommendations for 'undergraduate' study programs in computing.
- in the beginning of 2004, eLIG – eLearning Industry Group with its project "eLearning Cities Initiative" will adopt guidelines for robust and stabile network construct for eLearning. Those guidelines will encompass standards, infrastructure, architecture, content and market for that context, development of professionals and teachers and provide an implementation model.
- "Learning Technologies Workshop" was initiated aiming to encourage and stimulate development and use of relevant standards for European education. During 2001 and 2002, activities were ongoing to standardize EML (Education Modeling Language), to provide for use of common sources of knowledge, adapted to needs of individual user. In January 2003, issued were Standards for Ensuring Quality in IT-supported Education (CWA 14644), based on process-oriented approach and transparency of education resources. During 2002, developed was the standard for LOM (Learning Object Metadata) by IEEE/LTSC, while CWA 14643 is a standard dealing with problems of LOM internationalization. Dictionaries are being developed to enable machine-based translation of standardized metadata into different languages, aiming to preserve cultural and national specificities in Europe. LOM is the first official standard developed for e-education.
- OASIS project (Open Architecture and Schools in Society – IST-2000-26216) and SIF (Schools Interoperability Framework) were initiated with the objective of standardization in the field of EMIS.
- US Department of Defense and White House Bureau of Science and Technology launched in 1997 the initiative "Advanced Distributed Learning" focused on web-based education. In cooperation with IEEE, IMS and AICC developed was "Sharable Content Object Reference Model" (SCORM) – referent model for sharable operation software, runtime environment and model for aggregation of content.

9. CURRENT SITUATION

9.1. GENERAL SITUATION IN THIS FIELD

9.1.1. EDUCATION SYSTEM IN BOSNIA AND HERZEGOVINA

Education system in primary and secondary schools has the features typical of the socialist school of the former Socialist Federal Republic of Yugoslavia – collective-based approach to education, objectives identical for all, same curriculum content, one prescribed textbook, few practical exercises, dry lectures, blackboard and chalk as basic teaching tools and authoritarian discipline and dominant respect for reproductive knowledge.

In addition, permanent education of teachers and their professional development still do not go hand in hand with needs of the new age and challenges a teacher in one modern school should meet.

In FBiH, a total of 247.590 students were enrolled in the education year 2003/04 in 384 main and 668 branch schools. There are 13.735 teachers working in primary schools. 114.428 students is enrolled in secondary schools. There are 7.703 teachers in a total of 208 secondary schools.

Information for the RS dates back to start of 2002/2003. In 752 primary schools (265 main and 465 branch ones) enrolled were 114.098 students. 6.886 teachers work in education. There were 52.293 students enrolled in 2001/02 in 93 secondary schools in the RS. 2.892 teachers work in secondary schools.

In 2000/2001, 97% of children of appropriate age were enrolled in primary schools, but there were only 56% of children enrolled in secondary school. The war that brought destruction of infrastructure and collapse of economy had a negative impact on the overall quality of education. *Estimates* of the World Bank point to expenditure for primary education being at 2.7%, secondary 1.4% of the gross domestic product. Numbers suggest that almost 90% of FBiH education budget is spent on teacher salaries, leaving almost nothing for investments in infrastructure, training etc.

Funding education is a separate problem given the fact that financial power of certain cantons cannot provide for minimal salaries of teachers and strikes are a frequent form of struggle for material status of teachers. There is also a visible difference in salaries and overall standard between FBiH and RS. There is information indicating that BiH system of education is one of the most expensive education systems, although funds allocated in absolute amount for education are relatively low when compared to some other countries, but not is we consider the annual income per capita and link that to education-related expenditure.

Unsatisfactory funding means low social status for teachers and general discontentment in the education sector.

We could say that in this situation the use of ICT in teaching is more a matter of personal initiative of every individual teacher (that again depends on equipment in a school and its connection to Internet), rather than systemically arranged matter.

Today, the education process is going through radical reform at all levels. We could freely say that objectively poor economic situation of the overall society in BiH, although essential, is not the key negative factor in education reform. Education reform was made more complicated by absence of coordinated state-level education ministry. Reform, which should include depoliticization of education, is progressing however it is unjustifiably slow because of politicization of every one of its segments. Even issues that are relatively politically neutral, such as informatization and modernization, are becoming unnecessarily complicated and “prisoners” of political games.

9.1.2. Digital Literacy and Digital Division

Education system in Bosnia and Herzegovina is not a good service for information society.

Our society adopts more and more technologies that process information and as such, requires other forms of education for its citizens. Basic "service" that one education system should offer to such a society is digital literacy – knowledge of properties, options and ways of using ICT in everyday life. At present, the education system in Bosnia and Herzegovina does not provide elementary digital literacy for its citizens. Primary and secondary school curricula are not appropriate for that use (or do not include education for use of ICT in some grades of primary and secondary education or the curricula are appropriate or the textbooks or instruction are entirely inappropriate).

The society is even more fragmented in this regard. Rapid development of the societies and knowledge-based economies were Internet and ICT are used daily in different ways, bring about the risk of impossibility of social integration for those individuals and groups without access to ICT resources. This new division called «digital division» is growing in Bosnia and Herzegovina.

Inadequate curricula in primary schools, or good but erroneously implemented curricula cause that most population that completes mandatory primary education does not get appropriate knowledge to use ICT in daily life. Unfortunately, just over a half of that population completes secondary education. However, even that part of the population does not get adequate education for use of ICT in daily life. Some secondary schools are better equipped and have better computer programs, but most is at unsatisfactory level. In that way, a small but selected segment of the population gets adequate education for use of ICT in everyday life.

In secondary education, we should consider that information and communication technology changes drastically from year to year so that some acquired skills are very quickly becoming unusable and should be replaced with new ones. This can be overcome by adopting certain basic knowledge, independent of the current state of technology. On the other hand, when we talk about education for labor market, there must be a system that will monitor signals from this market and provide for development of new, "specialist vocation" in the field of ICT. Curricula are inflexible, options for innovation too slow and research of labor market needs in the field of ICT is not dealt with systemically.

9.1.3. Dissemination of Knowledge about Information Society

We cannot be satisfied with present level or impact of dissemination of knowledge about the information society in Bosnia and Herzegovina. Issues related to development of information technology, use of information technology bit also restructuring the society in terms of application of information technology in everyday Bosnia and Herzegovina, are shadowed by other, primarily socio-political subjects. Specialized additions in daily press, ongoing radio or TV shows unfortunately cover just a small aspect, application of new programs in the PC world.

Activities of professional IT associations are not consistent and focus on campaigns mostly. There is no cooperation with education institutions. In Bosnia and Herzegovina, there are no special symposia, conferences or campaigns to clarify fundamental terms, parameters and actors in the information society and explain strategy of change of the BiH society to the information and knowledge society.

9.1.4. Specialized Education for Information Society

Electrical engineering faculties are the principal stakeholders in the field of higher education and ICT in BiH. Certain fields are studies at natural and mathematical, economic and other faculties or faculties. A number of both privately and state-owned

education centers deal with institutionalize specialist ICT education and they offer courses in different technology. Such centers generally rely on education methods of the world leading computer equipment manufacturers (IBM, HP etc), communication devices (Cisco) or software (Microsoft, Sun).

Due to low level of adjustment of domestic higher education institutions to new trends and needs of the market, out-of-university education is gaining on popularity. In that way, certificates are acquired in a faster (but not necessarily easier) way than at universities. These are generally flexible programs, very much “in” but when it comes to quality, the situation is rather "colorful". There are good quality programs offered on the market, however they do not match almost any standard. Absence of practically any kind of certification system makes the value assessment of such diplomas even more difficult.

If the situation does not change soon, diplomas received at our technical faculties will lose the market match against global competitors. We should underline that some European countries (e.g. Denmark and Sweden) do not recognize diplomas of the leading IT companies. They compare them to their school and university diplomas. Other (primarily rich) EU countries are taking the same path, refusing “colonization” in education, coming from the USA. Developed EU countries consider this to be a very important strategic decision, without which their positions on the global ICT market would be in question.

9.1.5. POST-EDUCATION FOR INFORMATION SOCIETY AND LIFE-LONG LEARNING

ICT develops rapidly and much of the knowledge acquired presently will not be usable in ICT in a few years time. Regardless of the education level one might have (secondary school or university degrees), life-long learning is inevitable.

In Bosnia and Herzegovina, there is one more factor because of which the concept of ICT post-education must be developed. Due to the war and other misfortunes in the last ten years, we have generations that are, to put it mildly, "IT illiterate / computer illiterate". Many of such persons are unemployed. On the other hand, the economy of today and especially the economy of tomorrow is offering a lot more jobs directly or indirectly related to use of ICT, i.e. there are less and less jobs where use of ICT is at the minimum or is not required at all. Prequalification in terms of creating ability for use of ICT is an inevitable process for the existing labor force in BiH – it is ongoing and it will last for the coming ten years or so.

Unfortunately, this process takes places in unorganized manner – there are practically no systemic mechanisms in place. There is no law on prequalification and the existing legislation and regulations are very inflexible when it comes to prequalification. On the other hand, it seems there are relatively good capacities by means of which one can conduct prequalification of a large number of workers (education centers at universities or independent ones, companies interested in such activity, qualified teaching staff etc.). Encouraging prequalification for use of ICT through improved legislation and regulations in employment domain may start new industry while at the same time ensuring qualifications that are more necessary in present and future BiH economy.

9.1.6. SCIENTIFIC AND RESEARCH WORK

Without organized scientific and research work, the process of higher education is stripped of inflow of fresh knowledge and information. Regardless whether this concerns fundamental or applied research, that provides the teaching staff at higher education institutions with the possibility to apply the knowledge and skills acquired and to acquire new ones, significantly improving the teaching process.

Current situation in our country and in our neighboring countries is that there are no organized (mandatory) scientific and research work, especially in the domain of fundamental ICT. Such situation needs to change as soon as possible, regardless of that

fact that research is our country considered expensive and privilege of rich countries. On the contrary. Research is *conditio since qua non* for sustainment and continuous growth of technological and economic development of a country, as well as the most important guarantee for sustainment and growth of quality in education.

International aspect of scientific and research work in BiH is not at a satisfactory level either. Our institutions are not adequately linked with international ones, while international research projects are more an exception rather than a rule and the consequences are: poor knowledge transfer, generally lower standard of quality compared to global one, no use of very good international research funds etc.

Because of the war and the economic disadvantage, research, technology and development capacities are very limited in BiH. Large number of scholars and university professors have left the country. Unfortunately, this trend is still present. Percentage of allocations for science ranges from 0 to 0,1% in the budget, while in developed parts of Europe, it is usually around 1,5% (Slovenia allocated even 2% during some time, while in the former Yugoslavia, that percentage was 1,7%). That is why it is not unusual that people leave the country when once they obtain their bachelor, master or PhD titles. This is greatly damaging the country. Investments in teaching resources would fail if such resources are leaving the country.

9.1.7. Connection to Internet and Research/Education Networks

General situation with regards to application of ICT in education is improving but that trend is so slow that Bosnia and Herzegovina is not actually catching up with EU developed countries, instead – the divide grows wider.

For example, due to effects of the war, Bosnia and Herzegovina established connection to Internet relatively late. This fact in itself is not problematic - what is alarming is that in the last ten years there was no significant step forward in quality when it comes to connection of education institutions to Internet and development of research and education networks.

Starting with first connections executed during the war as part of the ZAMIR network (1994), over attainment of the first real Internet connection via the University Tele-Information Center (UTIC) in Sarajevo (1996, which is ever since the administrator of the country domain,.ba), to establishment of the Education and Research Network of Bosnia and Herzegovina (BIHARNET) in 1998, we do not have systemic and national level mechanisms for elementary questions of connecting education institutions to Internet and developing national research and education network.

The most serious attempt of resolution of this issue was made in 1998 with the establishment of BIHARNET, which was the first state-level institution of the kind. BIHARNET founding objectives were developing, organizing and work of the uniform education and research network in Bosnia and Herzegovina. In two years of its existence, BIHARNET was the leading force of connection. However, that project lasted as long as the founding donation, as there was no set arrangement for continued funding. Due to absence of government support, inter-city links were terminated.

Founders and Entity governments do not fund BIHARNET's work, although at the start of 2001 entity education ministers committed to taking over founder's liabilities and funding in ration of 2:1 (FBiH:RS). On the other hand, as there are no users, we cannot expect to receive financial support form these sources in the near future. Notably, even at time when BIHARNET secures minimum funds for global link and salaries of management and staff, by participating in a project or through a donation, it seems this does not have a particular effect as BIHARNET has not secured to its users access to this link.

Therefore, BIHARNET formally exists but does not function in practice. Bosnia and Herzegovina is a rarity – we are the only country in Europe where academic research and education network does not function.

When the BIHARNET network functioned, its segment covering the University of Banja Luka developed and maintained the University of Banja Luka Computer Center. At the beginning of 2000, for the mentioned reasons, quality of services BIHARNET offers falls under the necessary minimum. Decision of the RS Government from 13 June 2000 transforms the University of Banja Luka Computer Center into the Serb Education and Research Network of Republika Srpska (SARNET). Although four years have passed since SARNEt was established, it is still part of the University of Banja Luka. SARNET is now maintaining with difficulty the network of the University of Banja Luka.

Similarly, other education institutions have inadequately or not at all dealt with the issue of connection (University centers in Sarajevo, Tuzla, Mostar and Bihać are trying to offer some sort of support while large number of faculties and other institutions are connected to commercial providers). These are partial and very different arrangements but this certainly is not an education or research network.

It is quite clear that the key problem is that there are no or there are negligible funds in state, entity or cantonal budgets for support to scientific and research work and even less for to connecting research and education institutions.

All the aforementioned indicators point to a disastrous state of affairs in this field. It is obvious that such a situation represent a serious hinder to progressive education and research segment of Bosnia and Herzegovina and a direct obstacle to joining the EU.

9.1.8. ICT CAPACITIES

Education system in Bosnia and Herzegovina is based on the concept of oriented secondary education, knowledge transfer based on use of chalk and blackboard in classes, even at universities and it significantly differs from modern European education processes adopted and applied in Europe (computer and web-based learning, distance learning, knowledge oriented learning).

The fact is ICT technologies are underrepresented in the education process, the entire hierarchy of it, either as field of study or as a tool for acquisition of new knowledge. In comparison with the total number of teaching staff, percentage of teachers that use ICT in classes is very small. Around 45% of employees in education know how to use a computer, while only 5% of professional IT staff is employed in the field of informatics or equivalent services. There is no mandatory training of teachers in use of ICT in education, nor are there specially designed courses for their training and preparation for use of ICT in education.

Almost no education institutions has a developed mechanism of investment in enhancing computer capacities and education of staff in ICT.

Use of software is also of concern, because we often find institutions using unlicensed software, due to absence of copyright regulations. Small number of institutions use possibilities of software based on open code. Electronic education and distance education are now just starting to be applied, mostly at faculties, while life-long learning has not yet got the necessary level of offer or quality either by use of traditional methods or in the form relying upon electronic education.

Internet is rarely used as medium for delivery of electronic learning content. Very few education institutions have developed web portals to support the teaching process, even fewer number dispose of web-based platforms offering the possibility to develop electronic learning content, learning content management system, learning management system and electronic communication of participants in eLearning.

It is evident that Bosnia and Herzegovina has a long and demanding way to go in the field of applying ICT in education and one of the first steps is to enhance computer capacities in education institutions.

9.1.9. EDUCATION MANAGEMENT INFORMATION SYSTEMS.

We can freely say that there is not a single education institution that has an entirely implemented information system. There is a large number of institutions that do not have even their own computer network or some other systemic prerequisites for information system development.

Universities and faculties have made more or less successful attempts to implement EMIS (software developed at Mechanical Engineering Faculty of the University of Sarajevo, University of Tuzla), but we cannot say that either one of them is adequate or integral. We can highlight the comprehensive EMIS development project at the Sarajevo University, supported by the World Bank, but we cannot tell as yet what will be its real impact.

With World Bank's assistance, we are seeing execution of the only systemic attempt to introduce EMIS in primary and secondary schools. The idea is that schools and ministries of education will house parts of the information system that will contain databases on students, teachers and schools (location, inventory and investments). Objective of the system is to achieve rational management of limited resources in education.

In pilot schools and administrative offices in Republika Srpska, Central Bosnia and Tuzla, the newly developed software is being applied but we cannot as yet speak of the success of this project.

9.1.10. LIBRARY SYSTEMS

When it comes to library information systems (LIS), COBISS initiative is practically the only attempt to resolve this issue. Between 1998 and 2003, a total of 13 libraries from Sarajevo, Tuzla, Zenica, Bihać, Mostar, Srpsko Sarajevo, Foča/Srbinje and Banja Luka became part of COBISS BiH. 258 librarians completed the necessary training to operate the system. 75 librarians have the license to work on mutual cataloguing and 12 of them are librarians at higher education institutions. COBISS/OPAC data base created 201.548 of catalogue entries by 2003. In the first three months of 2003, total number of users amounted to 16.500.

This cannot be considered satisfactory, moreover it could be said this is devastating if we consider that LIS, in both conceptual and technological terms, are completely elaborated and accepted by most European countries.

In principles, LIS in BiH should have encountered no serious technical difficulties except for problems of organization and funding. COBISS BiH Center is a registered institution, founded by the universities of Sarajevo, the two universities in Mostar, Banja Luka, Tuzla and the Institute of Information Science in Maribor. However, like BIHARNET, there is no systemic arrangement for funding the COBISS Center and the situation is even more complicated by relatively unclear relationship with software manufacturer and co-founder, the Maribor Institute of Information Science.

9.2. LEGISLATION, REGULATORY AND POLITICAL ENVIRONMENT

9.2.1. GENERAL SITUATION

In Bosnia and Herzegovina, ongoing is the implementation of Education Reform Strategy. Coordinator of the international community's activities in terms of design and now implementation of this Strategy is the OSCE Mission. It is indicative that there is no direct mention in the Strategy of the role of education system as service for modern, informatized society or of the use of ICT in the education system. It is logical then to

expect that implementation of this Strategy, although improving the situation in general, will not affect directly the improvement in the aforementioned segments.

Important facts about reform and state of legislation, regulatory and political milieus in this domain are as follows:

- Adopted Framework Law on Pre-school, Primary and General Secondary Education in 2003
- Technical and secondary vocational schools are given the option to offer study programs of three, i.e. four years but also professional development for two years or specialist education after secondary education, lasting one year.
- In preparation is the Law on Technical and Secondary Vocational Schools where vocational training takes place. Selection of vocations students can opt for is outdated and has not been meeting needs of the labor market for quite some time. Harmonization of new nomenclature of vocations to be uniform in both entities is ongoing and its adoption is expected during the year.
- In October 2003, adopted was the "White Paper", which is essentially agreed policy and strategy of education, accepted in both Entities. This document should be followed by legislation and micro-level application. In the "|White Paper" emphasis is placed on lack of equipment in schools, lack of connection of schools into one information system, insufficient use of ICT in teaching but the paper does not offer elaborated concepts, only general recommendations.
- The Law on Scientific and Research Activity exists in Tuzla and Zenica-Doboj Canton and the new FBiH-level Law on Scientific and Research Activity is being drafted.
- On 22.4.2004, Sarajevo Cantonal Assebmly adopted the first Low on Scientific and Research Work. With this low, 2% of of cantonal budget is reserved for science and research that fullfils the ambition of level of our higher education.
- at the level of the Council of Ministers, there is no one Ministry that would deal with this domain.
- Higher education is legally regulated at Cantonal level. The recently adopted "Framework Law on Higher Education" is still not being applied. This Law was drafted bearing in mind implementation of commitments in the Bologna Declaration, which BiH signed in December 2003.

Our country voiced its orientation to modernization of higher education according to EU standards. Credit system remains to be implemented and thus provide for mobility of students and teachers. That is expected in the near future and preparations are ongoing. Most universities are already working on amending curricula in the field of ICT.

Additional problem in defining new curricula is that there are no clearly defined market needs either for number or profile of necessary experts in the near future. Without that, uncritical "copying" of another's standards (EU or IEEE/ACM) will not yield acceptable results.

In general, the ongoing education reform progresses in positive direction while both legislative and regulatory environment is becoming better and better. The key factor having negative impact to further development is the political environment. It is still in poor condition and it is not showing signs of improvement. "Fragmentation" of political power on entities and cantons does not render efficient implementation of reforms while objectively implementable matters often end up in "gaps" of endless political games causing slow pace of implementation.

9.2.2. CONNECTION AND CAPACITIES

From legislative and regulatory perspective, the field of connection is entirely unregulated. Unfortunately, individuals and institutions competent for significant decision-making are not genuinely convinced in the effect the Internet and research and education networks have to development of research and education institutions in the entire Bosnia and Herzegovina.

As there is no solid political will not strategy to regulate this domain soon, the time of drafting appropriate legislation and regulation for this field is ahead of us. Appropriate example that directly confirms the said statements is the foundation and closing of the Education and Research Network of Bosnia and Herzegovina – BIHARNET. In reference to that, we have the decision of the government of Republika Srpska from 13 June 2003 which provides for establishment of the Serb Education and Research Network of Republika Srpska (SARNET), in contradiction with the elementary legal regulations about the national education network whereby a country can only have one education network.

On the other hand, process of organization of the telecommunications market advanced but it did not result with the expected better geographic coverage of telecommunications infrastructure, better service quality or lower prices. Seemingly created competition between three operators in the entire BiH is not real – as providers develop infrastructure and services only on "their", nationally homogenous territory.

There are several very aggravating circumstances related to development of ICT in education institutions:

- Universities which switched to treasury operation system, are encountering serious difficulties in daily operation, especially when it comes to procurement of new equipment.
- Adopting a new Decree for public procurement is making the procurement of equipment even more complicated. Particular danger is presented in the obvious priorities given to cheapest options, in comparison to some more important aspects relevant in purchase of equipment (compatibility, quality etc).
- Obtaining approval from competent Ministries to purchase new equipment for education purposes with custom and tax deductions is a long-term process that is often discouraging to the education institution to request such things and slows down the process of equipment purchase.
- High tax rates on procurement of computer equipment for physical persons, among which is the majority of students and pupils, is greatly hindering the process in increase of ICT literacy. Participants in the education process do not have any custom or tax deductions.
- Absence of the Law on Textbooks, and on electronic textbooks in particular, leaves a lot of room for use of inadequate and outdated textbooks in teaching, which represents a special problem in the field of ever developing and ever changing ICT.
- Non-application of the Law on Copyright and related rights is discouraging development of software and electronic education content and provides for use of unlicensed software in education institutions thus slowing down opening of national offices of the world ICT companies (IBM, Microsoft, etc.) that offer deductions in purchase of equipment for education institutions.

9.2.3. LIBRARIES

Cantonal authorities or competent ministry in the RS have exclusive competence over the library system. The existing legislation defines relations in libraries as independent institutions, functioning of the national library, mandatory copy, while aspects of LS

(library system) or LIS (library information system) are poorly developed or not in place at all.

There is a great divide caused by reduction in functions and activities of libraries that use to be part pf legislation, in connection with the System of Scientific and Technical Information (SNTIJ) of SFRJ (Socialist Federal Republic of Yugoslavia) and then of the project of Uniform Library and Information System (JBIS) and a number of laws defining functioning of hybrid institutions that financed projects in the field of library information system.

9.3. TECHNICAL EQUIPMENT - HARDWARE

Level of equipment in education and research institutions is entirely unsatisfactory. Procurement of equipment is mostly done in unsystematic manner (from case to case). Under such circumstances, evident is the incompatibility and diversity of equipment between different users or with just one of them. In cases where users are not investors also, lack of uniformity is even more distinct.

Situation with network equipment is particularly unsatisfactory. At higher education institutions, around 60% of computer resources are networked. In primary and secondary school, the situation is more difficult. Estimates are that only around 10% f computers in primary schools are networked. Therefore, very scarce computer resources are irrationally used in institutions because of poor connection inside those institutions.

In institutions where local computer networks exists, networking is a significant problem already within smaller institutions and especially there where bigger networks are in place. Lack of systematic planning and low quality of equipment create lasting difficulties in use, maintenance and expansion of network resources. Consequence of that is unreliable work and ultimately a very high price for the impact achieved.

From the perspective of maintenance of the existing network equipment, which is potentially the basis for the future work of the research and education network, this problem must be viewed from another perspective. In case of any serious investment in this sector, we should not count on the existing computer resources.

Until now, there were almost no quality analysis on education and use of ICT in education. The first serious analysis was provided in the ICT Forum «eReadiness Assessment Report» of UNDP BiH. Survey conducted for this report, covering a total of 269 institutions of different type, from primary and secondary schools to faculties, reveals the following state of affairs:

	Number of schools	Number of computers	% type of institution	% computers in total	Average
TOTAL	269	4795	100,00	100,00	17,83
PRIMARY SCHOOLS	133	1289	49,44	26,88	9,69
SECONDARY SCHOOLS	77	1258	28,62	26,24	16,34
FACULTIES	59	2248	21,93	46,88	38,10

Results of the research undertaken by JP BIH TELEKOM in 2002 were used by the Federation Ministry of Education, Science, Culture and Sports in publication of the document titled “Internet in primary and secondary schools in the Federation of BiH”. 65% of the total of 205 secondary schools responded to our research, including 46.8% o of the total of 384 primary schools in the Federation. Research in primary schools shows the following state of affairs:

- 27% of schools have no or one computer only
- 57% of schools have less than 5 computers

- 18% of schools have more than 9 computers
- 4% of schools have more than 15 computers
- 43% of schools have Internet connection
- 40% of schools have an e-mail address
- 8% of schools have a web page.

Research in secondary schools shows the following state of affairs:

- 37% of schools have no or one computer only
- 24% of schools have less than 5 computers
- 29% of schools have more than 9 computers
- 10% of schools have more than 15 computers
- 70% of schools have Internet connection
- 40% of schools have an e-mail address
- 19% of schools have a web page.

Based on this research, initiative was launched to increase number of Internet connections in schools in FBiH. Federation Ministry of Science and Education prepared a proposal of measures to provide Internet access in schools in FBIH. That proposal states that 16.462.000 KM should be allocated to equip 389 primary schools (not including branch schools) and 205 secondary schools to purchase 16 new computers each, software, for costs of internet, maintenance and purchase of additional equipment.

On 22 March 2004, the FBiH Government adopted the Information on Application of Information Technologies in Schools in FBiH ("NET-School") and tasked the federation ministry of traffic and communications and the ministry of education and science to commence with its implementation. The Government also tasked JPBH Telecom d.d. Sarajevo and HT d.o.o. Mostar to actively participate in the operational implementation of this project. Aim of the project is to provide all students with opportunity to master information and communication technologies which should contributed to positive changed in the education system in FBiH.

In the library sector, apart from configurations related to participation in the COBISS structure, libraries in general do not have specific configurations while most faculty libraries use the existing network resources of the Faculties in which they operate.

9.4. PROGRAM SUPPORT-SOFTWARE

Previously undertaken analysis show that situation with software resources in Bosnia and Herzegovina is similar to the one with hardware. There is no, to start with, a strategy of purchase, maintenance and rational use. Unlicensed software is still widely used. This problem is not given due attention although it is clear this situation will have to be dealt with soon. MS Windows is the operation system in dominant use in education and research institutions, present in more than 65% cases (realistic percentage is probably much higher is we were to consider institutions for which unreliable data is available). In applicative software, MS Office is mostly in use. Applications are partially developed at individual institutions. There is almost no cooperation in this regard and it is often the case that applications are developed in parallel to meet the same needs. That results in many partial attempts with solutions of lower significance.

Concerning use of education software in primary and secondary education, we can find very few institutions that use commercial or that develop their own education software. Use of education and applicative software at universities is very different: there are institutions that do not possess any of the mentioned software, while there are also institutions that have gone relatively far in use of these tools. This particularly goes for technical faculties where most of

laboratory work is based on licensed software packages (AutoCAD, Mathlab, Cosmos, Pspice,...).

Most faculties concentrate on development of that part of the information system which they need, such as students' services and department of finance. Although they are in some places attempting to integrate some sub-systems at the university level, there are no implemented integral university information systems. The main problem that will soon appear is the process of university integration, to which all universities in the country must accede. This complicates the problem even further, especially in the case of integration of those faculties that already possess their own information system into a uniform university where certain parts of the IS will have to be uniformed or even centralized.

Apart from standard applications and program support of COBISS system, there were no greater proliferation of special applications for library operation, library catalogues or bibliographic processing

9.5. DISTANCE EDUCATION SUPPORT CAPACITIES

There are no accurate researches conducted in our country to show the real situation regarding use of ICT as support to distance learning. The fact is there are individual initiatives, mostly at faculties/universities, that result in implementation of smaller pilot projects. It is necessary to mention the following initiatives:

- The Economic Faculty in Sarajevo has several pioneer programs in this field (IDL project from 1998 in cooperation with the Soros Foundation, cooperation with the Loyola University Chicago and E-Net Center GDLN program) using ICT technologies as support to distance education.
- Since 1999, ODL Center is operational at the Electrical Engineering Faculty in Banja Luka. Its primary role is to promote, develop and improve methods of learning, based on modern information technologies.
- IT study program in Mostar offers the possibility of distance learning since 2001/2002 education year. Students can access all exercises and lectures posted on the faculty web page, they can register for exams on-line and have asynchronous communication with teachers via e-mail or forum. Regardless whether this program of study is organized in traditional fashion or supported by distance learning, it is also commercial, i.e. students pay for schooling.
- During 2002 and 2003, World University Service (WUS) Austria rendered support to development of eLearning process through its programs Distance Learning 2002 and Distance Learning 2003. During the two years, universities in Tuzla, Banja Luka, Sarajevo, Bihac, Mostar East and West, obtained funds for that purpose.
- At the start of 2003, University of Tuzla established the University Center for Development of Distance Education - UCDED, aiming to provide technological, organizational and didactical support to development of distance education at the University. Two modern multimedia halls are part of the center, equipped with video-conference system and IT training capacity.

10. VISION OF NEW SITUATION

One of the priorities for accession to European integration is the transformation of the education system and increased reliance on ICT in the education process. This chapter outlines the envisioned situation hat should be achieved by 2010-2015.

10.1. EDUCATION AS SERVICE FOR INFORMATION SOCIETY

Digital literacy

Definition of general literacy will include the minimum level of digital literacy. Task of the education system will be to increase general digital literacy of the population, that is digital literacy will be part of the common core curriculum for primary and secondary schools.

Post-education and life-long learning

Due to introduction of new parameters of valorization upon employment or advancement at work the population will continuously work on improving their knowledge of ICT use. Life-long learning will become inevitable and a requirement for quality life in the information society. Because of that, there will be more requests to increase education capacity for this purpose. Life-long learning will be the main driving force in increase of adaptability and employment opportunities in the competitive knowledge-based economy. Well known adages: “learn when you want”, “learn where you want”, and especially “learn when you need to”, will be part of the education system through the concept of post-education and life-long learning.

Using ICT can significantly improve the position of persons with special needs in terms of securing better opportunities for employment and better integration into the society. That is why the education system will have to, in basic curricula but also through the concept of life-long learning, offer ICT training programs for persons with special needs.

Dissemination of knowledge about information society

All capacities of the education system will be partially used for promotion and dissemination of knowledge about the information society.

The education community will use all available communication channels to raise awareness on the need to adjust to life in the information society (teaching in itself will be used as a communication channel to that end, specialized magazines and columns in daily papers, contributions of the education community to specialized TV and radio shows, etc.).

Evolution of Curricula

Primary and secondary education curricula will be changed to meet the new requirements imposed by the need to redefine digital literacy and life-long learning.

During primary education, pupils will be trained to use computers and network services, including use of all components of the computer, basic word processing, use of presentation tools, table calculators and Internet.

In the field of higher education, changed will be the curricula for technical faculties, but also for faculties of social sciences, humanities and art school as well as faculties of natural sciences. Students of technical faculties will be able to achieve the level of ICT knowledge which will provide them with active participation in innovation and development of the economic sector. We need to highlight here the group of faculties’ education students which will be dealing with ICT professionally (potentially the future teachers in schools) for which special curricula need to be prepared. Students in other fields will be trained for specific application of ICT in their given field of study.

Education of teaching professionals

Apart from increasing general digital literacy, the process of spreading digital literacy among all those involved in the teaching process will be completely over by 2010 – teachers, administration and management in all institutions of pre-school, primary, secondary and higher education.

Focus will be placed on training teachers of information technology and continued certification of their knowledge in the field of ICT. Ensuring the critical mass of certified teachers of information technology, we will ensure stakeholders for training other teaching staff on suing ICT in education. These teachers will be involved in processes of ICT training of the local population and parents in particular.

Specialized information science education

Curricula for specialist ICT education at universities and secondary vocation schools will be revised and made relevant to meet new needs. They will be more flexible in terms of refined categorization of fields of specialty and rapid reaction to changes in the environment, that is they will be more flexible with regards to interdisciplinary specialties. With others, open source platforms will be used as the teaching means to study fundamental disciplines of the information science.

During design of curricula for all levels of this education, especially the higher education level, used will be the experienced and recommendation of renown world associations active in the field of information and communication technologies.

Encouraged will be opening and work of parallel non-traditional forms of specialist IT education, which will be systemically linked with institutions of traditional education.

Scientific and research work

We cannot expect progress of creation of appropriate human resources n any field without the scientific and research work and without the human resources we cannot expect good implementation of any other development program. Because of that, the state will in both direct and indirect manner support scientific and research institutions and programs in the field of ICT. It will particularly encourage all scientific and research programs with international participation.

Financing the participation of BiH teams in world, European and regional competitions in information technology for pupils and students will be supported at state level.

Libraries

Increasing digital literacy through libraries will be one of the priority tasks in expanding and affirming the role of public and school libraries. Libraries, and public library sector in particular, that is public and school libraries (in primary and secondary schools) will become important contact points of acquiring knowledge on he information society as well as points of learning, spreading and enhancing digital literacy.

Through electronic publishing and digitalization of library material, libraries could significantly increase their own resources given the fact that two criteria could be combined during digitalization – rare and culturally and historically important material that is often used but there are not enough copies to meet the needs of readers.

10.2. USING ICT IN EDUCATION

Connection to Internet

All universities, schools (primary and secondary), institutes, libraries, museums, archives, dormitories will have broadband access to Internet. The state will subsidize lease, so that for every education institutions it will be free of charge or a lot cheaper than for profit

organizations. Therefore, every education institutions will have a free or almost free connection to Internet via broadband access, with defined minimum transmission volume.

Public communications infrastructure will be used for that end, based on optical links and systems of digital transmission based on *IPv6* technology and very high QoS. This will provide for different forms of electronically supported learning, (video upon request, rapid access to Internet services, *on-line web* support to learning, *on-line* exchange of large volume data, ...).

Research and Education Network

National research and education network will be covering the entire Bosnia and Herzegovina. All education and research institutions will have access to the network. National education and research networld will be the main factor of harmonization and advancement of work at all education and research institutions in BiH, and it will also be integrated into the pan-European education network.

National research and education network will have a stable funding source to carry out its principal functions. Funding will be provided by: Council of Ministers, FBiH Government, RS Government and competent cantonal ministries. Additional funding source will be made up of funds from network member organizations for the purpose of network maintenance. This source will indirectly come from entity/cantonal government, contributing to greater interest in the work of research and education network.

Computer capacities for teaching, scientific and research work

Using modern ICT in teaching and research will facilitate the process of transfer and acquisition of knowledge, save time of participants in research and directly support the research and teaching process and projects while ensuring cooperation with related institutions at state and international level.

Equipping schools and faculties with the necessary computer equipment will be a continued process, given the frequent progress and equipment becoming outdated relatively quickly. It will be necessary to annul or significantly decrease custom duties and taxes on computer equipment for education, while for students and pupils, ways should be found to facilitate paying, give state loans implemented by commercial banks.

Standardization of computer hardware and software will be encouraged, but not o the extent of closing into one option – students and pupils must have access to as wide scope of technologies as possible (for example, standardization in terms of use of open source and proprietary solutions will be based on clear calculations of cost/benefit ratio), however, institutions will use to a lesser extent those solutions that have poorer cost/benefit ratio because it is necessary that students and pupils come in contact with as many different technologies as possible during their schooling.

Computer capacities, including those related to electronically supported learning will have specially designed elements important for supporting learning of persons with special needs.

Assistance to electronically supported learning

Concept of distance learning will not aim to replace the overall traditional pedagogy, but to expand and transform it, creating a new mixture between learning “face to face” and electronic interaction. New information technologies and learning paradigms will be directed at changing the “traditional university” and “traditional schools” in terms of their advancement and integration of additional material and forms of education. The primary goal before us is to provide students in Bosnia and Herzegovina with access to courses and information, seven days a week, twenty-four hours a day.

This will facilitate introduction of the life-long learning education based on distance education, as one of services offered by individual schools, universities and specialized education centers.

Education Management Information Systems (EMIS)

For primary and secondary schools, developed will be a standardized EMIS mechanism which can be used in the entire country. Such mechanism will be offered, under favorable terms, to competent ministries, that is primary and secondary schools. Accepting the standardized mechanism by as many ministries will be encouraged in different ways, by providing as favorable conditions of implementation and maintenance as possible and continued development of new software options etc.

All existing initiatives related to EMIS development at universities will be encouraged by the state by means of providing favorable loans and additional budgetary funding. University budgets will get a particular budget line to fund and maintain EMIS.

Except to institutions' management, EMIS will be accessible to students/pupils via Internet or via access points in education institutions (terminals, kiosks, computer centers).

EMIS will be used at education system management level. Ministries of education, agencies and other management or regulatory structures will be connect with EMIS at education institutions and will have an effective access to information necessary for education system management.

Library Systems

Library system needs to be developed in to complementary direction, aggregate and referential. Aggregate aspect means that a library system must establish its own data base on resources in libraries of the system. Exchange and use of this publicly accessible data (OPAC) is considered as fundamental function of the system, implemented as activity of coordinated, mutual cataloguing and managing bibliographic data bases (through the COBBIS system).

Second, referential function of the library system is to offer services of access to other information, aggregate bibliographic or factographic data bases which are maintained and offered to the education and scientific sector usually by means of subscription.

10.3. QUALITY AND STANDARDIZATION ASPECTS

All quality and standardization aspects will be regulated by corresponding regulations and standards. Special attention will be given to the assurance of the quality of standardization in following fields:

- Education and certification of the informatics teachers in primary and secondary schools;
- Education of lecturers (not involved in the field of ICT) in higher education and other specialized institutions in use of ICT in education and research process;
- ICT capacities that are in use in education institutions, in research institutions and libraries.

11. STRATEGIC GUIDELINES

In this chapter presented are strategic guidelines that give main streamlines of action in terms of implementation of vision, that is change from the existing the desired situation.

Concrete actions are defined based on these streamlines (Initiatives, Development Programs, Projects etc.) making the Action Plan of development of information society for the period 2005-2010.

11.1. EDUCATION AS SERVICE FOR INFORMATION SOCIETY

11.1.1. DIGITAL LITERACY

First step on the way of building information society is the "digital literacy education process", education of the society in general in basic knowledge about the use of computers and internet. It is only through that process that we can see direct use of the ICT in improving the quality of life.

The aim of the education system must be to increase the level of general information literacy of the population. It is necessary to include the minimum of digital literacy into the definition of general literacy, i.e. include it in the common core curriculum for primary schools.

Older generation also need to be subject to digital literacy education process. IT education needs to be provided free of charge for adults in groups of limited number, aiming to acquire basic IT knowledge. Specialized and certified education centers will conduct the training. This kind of education will be conducted with financial support from competent ministries, Pedagogic Institute and employment bureau.

In addition, it is necessary to organize education courses for adults in schools in local communities, in cooperation with the private sector and with participation of ICT-trained teachers.

Through the establishment and permanent evaluation of the definition of basic knowledge for "knowledge society", where one of the most important elements is the basic ICT knowledge, it is necessary to encourage the population to continue advancing their ICT knowledge. In order to make this a reality, it is necessary to incorporate parameters of evaluation during employment and professional advancement.

The national digital literacy standard must be compatible with the EU standards. Defined must be the basic knowledge necessary for inclusion of the individual into the "knowledge society". Some already developed evaluation systems of ICT knowledge and skills will be applied (like ECDL – European Computer Driving License). Methodology of digital literacy evaluation has to be designed. Increase in level of digital literacy must be evaluated by means of external control.

To achieve all this, first it is necessary to change curricula and change the way of presenting knowledge/information. Multimedia content must be added to written material (textbooks, manuals, practicum, etc.). That is why design of new digital textbooks and preparation of all content and materials in electronic form will be encouraged.

Delivery of such material should also be conducted in a different way. It is important that information is accessible to all potential students. Quality connection to the Internet can facilitate to individuals access to this information. Through preparation of quality material in the field of ICT and facilitate approach to them, the education institutions must be in the position to significantly contribute to increasing the level of general digital literacy. Transformation and connection of the libraries in under such circumstances is also very important.

Employees in professional services (Pedagogic Institute), ministries and agencies also need to complete the digital literacy education process.

11.1.2. POST-EDUCATION AND LIFE-LONG LEARNING

Change the concept of higher education, post-education and life-long learning have a completely new role. They become obligatory and inevitable regardless of their form. That is why constant change and additional work on the curriculum is necessary for this type of education. Graduate study programs in ICT must be transformed into a number of interdisciplinary lines aiming to training participants in independent research in the specific field and in gaining new, fundamental and applicable knowledge and skills for a more successful performance in the domestic and global labor market.

All universities and as many secondary schools need to be involved in these processes. The entire school system must be adapted to life-long learning and post-education. Some secondary schools and faculties will, independently or in cooperation with private sector, become centers for education of adults in the field of application of ICT. That is how we will ensure additional funds for further enhancement of computer capacities, that can be afterwards used in general education.

Aiming to achieve labor market flexibility, life-long education becomes inevitable and it is necessary to adapt the employment policy to this new trend. Better-educated individuals will manage their way better on the knowledge market.

Good connection will enable interaction that can be implemented either from home or from the work place. This has to be taken advantage of and education material and education system ensured for life-long learning, adapted to middle aged and senior citizens, ensuring the system of part-time education and vocational retraining programs for unemployed people.

In that regard, distance learning will take a special place in life-long and post-education because of the flexibility of time and space. This kind of education contents will get in importance because it is adapted to this target group of population.

It is necessary to develop special programs for use ICT for persons with special needs. It is necessary to offer most of these programs in the form of flexible post-education, so that persons who do not have special needs time of birth do have the opportunity for vocational retraining. This is very important because use of ICT very often offers to these persons full integration into the society, which represents double benefit for the entire society – such persons get a better employment opportunity, becoming productive members of the society, and secondly there is less need for the society to give them material help.

11.1.3. DISSEMINATION OF KNOWLEDGE ABOUT INFORMATION SOCIETY

If we look at the dissemination of information and knowledge about the information society as inevitable process of informing about the present situation or degree of transformation achieved, i.e. as the mechanism to collecting information about informatization, then it is necessary to conceptualize a mechanism that will regulate this communication from one place. In that regard, it is necessary to establish some kind of referential center where all the information about results achieved, resources, procedures and development of those recourses actively participating in informatization will be gathered. That kind of referential center (Center for navigation of knowledge about information society) should be part of Information Society Agency.

Different forms of communication of Referential Center to other users will refer institutions and resources (schools, universities, education centers, libraries and other institutions) to real places of the dissemination of knowledge.

Functioning of the appropriate database on technologies and potential of the ICT needs be ensured within the research and education network, to be updated on-line by every member association for itself. Data from database must be accessible to the interested parties through on-line web portals. This is how efficient dissemination of knowledge to the different target groups can be achieved.

In parallel, there will be a spontaneous dissemination of knowledge toward the environment through quality access to the Internet and through the media. This process needs to be structured and used in full. Education community must use all available communication channels to raise awareness about the need to adapt to life in the information society (education process by itself is a very good communication channel, as well as specialized magazines and columns in the daily newspapers, involvement of education community into the specialized broadcasts, radio and TV reports, etc.)

11.1.4. Evolution of Curricula

During secondary education students must achieve basic ICT knowledge. Given the fact that ICT dramatically changes all the time, those parts of the curriculum relating to acquisition of practical skills will need to be continuously amended while those that relate to basic knowledge do not need to be amended very often. This new approach to the education has to prepare students for acquisition life-long education and skills connected to the new technologies.

Implementing the common core curricula in primary and secondary schools creates basic preconditions for unification of teaching content in the entire BiH. The Curriculum Agency should standardize curricula of the basic digital literacy and elected subjects in IT and Computers subject in primary and secondary schools.

IT subject syllabi for primary and secondary schools must be in accordance with the European/world standards of basic information/digital literacy (presently ECDL/ICDL “start” for primary school and ECDL/ICDL “full” for secondary school), so all students must take that exam in order to obtain a passing grade in IT subject. IT education will be obligatory for all students beginning fin one of lower grades (depending on the established pedagogic norms), but not later than the fifth grade. General IT education must be obligatory also during two years for all other secondary schools.

The Agency has to redefine and standardize curricula of all other common core curriculum subjects. Curricula will be not containing unessential information, the ICT will transform methodology of teaching, learning and assessing. Curricula content will consist of both digital and e-learning content. Curricula need to be compatible with corresponding curricula in EU schools.

The Agency needs to evaluate curricula, in accordance with continuous redefinition of basic digital literacy, syllabi for elective subjects and vocational programs. For elective IT teaching, as in vocational subjects in vocational schools certified programs of world companies may be considered. The new joint classification of occupations for the entire BiH will contribute to standardization of IT and other programs in secondary technical schools. The entire process has to be followed by evolution of curricula at faculties and pedagogic academies.

All higher education institutions (technical faculties, faculties of social sciences and humanities, academies and faculties of natural sciences) will, without exception, include subjects that provide the necessary knowledge for use of ICT in their fields.

Curricula in ICT related subjects at the higher education institutions where those technologies are not primarily needed, are to be prepared by the competent institution. ICT professionals with adequate professional qualifications must be teaching.

In BiH (or larger) we need an institution that will coordinate assessment and approval of curricula for non-IT education institutions at university level. In the process, we need to carefully balance global and EU standards with our needs and our reality.

11.1.5. EDUCATION OF TEACHING PROFESSIONALS

Apart from lack of adequate equipment, the basic problem related to use of ICT in education is insufficient level of ICT knowledge among teachers in schools. Training teachers to use ICT while teaching represents a strategic question of development of the entire education system.

Education process of the existing teaching staff understands introduction of digital literacy standards for all those that are in any way involved in teaching. In addition, all teachers who teach ICT related elective subjects will have to pass specialized trainings. The program of basic training has to be the expanded version of ECDL program (ECDL + ECDL Advanced + use of specific applications for testing and registration).

Process of education of teachers has to be followed by education of management and administrative personnel in all education institutions (preschool, primary, secondary and higher education) and will be conducted in Centers for professional development of teachers and schools.

All IT teachers for primary and secondary schools must be professionals, i.e. have completed appropriate schools for IT teachers (pedagogical faculties, faculty of natural sciences and math, faculties of electronics).

All ICT teaching professionals must renew certificates of knowledge every 4 years in the education centers (Centers for specialized information science education). Same centers will provide education services to ICT teaching professionals, with the aim of certification. defined will be “personal ID” of ICT knowledge to be owned by every ICT teaching professional.

Teaching professionals from other fields will pass courses of additional education for use of ICT in education process, according to defined needs and will have to recertify their knowledge every 8 years. Standards and Assessment Agency will specify the needs. Education will be conducted in Education centers, as it is mentioned before.

All faculties, academies and higher education institutions that educate teaching personnel need to introduce subjects in which future teachers would acquire basic knowledge of electronically supported teaching methods and new possibilities for teaching.

Aforementioned activities can only be efficiently implemented if the activities planed in the section part „Computer capacities for teaching, scientific and research work“ are implemented.

11.1.6. SPECIALIZED INFORMATION SCIENCE EDUCATION

Information society standards require quality ICT system. Educated human resources knowing how to use ICT represent the precondition for successful transfer of technologies, research in wide range of fields and other forms of activities aiming to generate some segments of production.

As BiH doesn’t have the mechanism to attract quality IT human resources, the solution is in education of its own. However, one thing is to educate persons, and the other to keep them (prevent brain drain), which is possible only by educating persons according to local demands. Then it is possible to increase opportunities of the newly educated professionals to be employed and well paid, i.e. so they don’t need to leave the country. Therefore, while preparing the curriculum for specialized ICT education, special attention

should be given to the real needs in the environment, the local ICT industry in the first place.

Specialized IT education will be first acquired in specialist secondary schools and specialist faculties.

Specialized IT education will be acquired also in the parallel forms of education (in special education centers joined to education institutions with other parts of public sector, economic entities and private sectors (ICT related technology parks, institutes, etc.).

11.1.6.1. SPECIALIZED ICT-RELATED STUDY PROGRAMS

Faculties must redefine, complete and develop new curricula. They have to ensure mechanisms so that external practitioners and licensed education centers can participate if necessary in the process of specialized education.

Program's basis for establishing new faculties or departments for specialized IT field will be supported.

The European Credits Transfer System is the concept that needs to be fully adopted (ECTS).

For the ICT field, it necessary to accept concept of study programs divided into three levels: First level - basic studies (3 years), second level – advanced studies (2 years) and third level, doctoral studies (3-5 years).

New curricula has to be in accordance with global standards, but adapted to the local needs. While redefining and adopting the new curricula, it is necessary to use as much as possible the information about human resources needs in the local ICT industry, especially in the private sector.

During these studies, it is necessary to provide students with possible choice of parallel forms of education (in special education centers at the universities, independent education centers, education center of large ICT companies, centers joined to education institutions with other parts of public sector, economic entities and private sector (technology parks, institutes, etc.)These subjects have to be certified in advance by the university as appropriate for inclusion into the ECTS.

11.1.6.2. SPECIALIZED SECONDARY TECHNICAL SCHOOLS

Specialized IT education is acquired in appropriate technical vocational schools or attending elective subjects.

Curricula of specialized IT education must be related to the needs of the uniform BiH labor market. Having this in mind, the education system must establish stable mechanisms of cooperation with ICT companies, economic chambers and other institutions and associations involved in the field of economy.

Because of obvious lack of ICT specialists here and elsewhere in world it is necessary to separately stimulate acquisition of this kind of specialist knowledge through out-of-school work with talented students, organization of competitions in accordance with international norms, inclusion of basic ICT knowledge and ICT identification card on the labor market and quality evaluation of specialist study programs.

Secondary education curricula of the specialized IT education must be revised and updated every school year. It is particularly necessary to promote open platforms (open source) as a teaching tool for research of fundamental IT disciplines.

11.1.6.3. PARALLEL FORMS OF EDUCATION

Encourages will be openness and work on a parallel nontraditional forms of specialized IT education, like the curricula of the leading ICT world companies, and acquiring certificates for use of computers (for example, European Computer Drivers License – ECDL) within or similar institutions of traditional education.

Big ICT companies should be encouraged to conduct training and examinations in BiH via partners/representatives. Such qualifications should be recognized during employment.

Also, independent education centers, conducting education according to standardized curricula of large world companies, should be provided with participation in education processes at the universities, within the ECTS.

11.1.7. SCIENTIFIC AND RESEARCH WORK

Scientific and research work in the field of ICT should be brought from its relative condition of apathy to at least the organizational level that had existed in BiH until 1992. Scientific and research work must become an obligation of all professors from all fields of ICT at higher education institutions. The state must finance basic costs of such activities, regardless of their short-term results. It is necessary to establish permanent funds for, before all, fundamental researches. Education institutions, not individuals, should utilize funds. It is necessary to promote, through these funds, those researchers who specifically contributed to the implementation of new ICT in their institutions.

Applied researches with low budgets must be the starting point of the scientific and research work policy at those universities that teach ICT. More serious investments in the projects of development and research should be left to the institutions and their ability to provide funds in open market, but the state must stimulate the economy through tax and other special deductions, to invest in applied researches at universities or its own research institutes. On the other hand, fundamental researches of interest for the state should be financed by the state through special funds.

Undisturbed and free of charge use of research databases as well as all other computer capacities should be ensured for the scientific and research work.

Good connection of research institutions in BiH should enable cooperation of various research teams in joint or similar tasks. At the same time, transparency in this field will be achieved. This is a precondition for sound competition and creation of single scientific and research space wherein only the best projects will be promoted.

11.1.8. LIBRARIES

Considering the issue of library system and the function that libraries may have in the structure of information society, we point out that, in the field of library system, urgent steps must be taken to bring this field to the level of its possible and quick integration into the context of information society development.

That specifically means that the libraries, especially their standard functions, must be consolidated and then rendered capable for the new developmental «informational» function. Before all, we view this function as a support to the development of digital literacy of library users who will have to master specific techniques of browsing various electronic resources.

All types of libraries can and should be the real stakeholders of digital literacy development, and permanent – in some cases the only – places or points of contact wherein the population encompassed by the education process as well as third-age generation (in case of public libraries) meet and use Internet and Internet resources. More precisely, libraries can be stakeholders of digital literacy in the areas where there

are libraries and where education institutions cannot completely provide basic IT knowledge. Furthermore, libraries may be points of contact for adoption of digital literacy for the part of population that does not belong to education system. Finally, libraries can focus on digital literacy education process for the part of population that needs electronic information, but does not explicitly belong to aforesaid categories.

Development of digital literacy within libraries, especially public and school (elementary and high school) ones, is complementary to the basic function of library system concerning offering various information needed for the education process. Also, this process is not contrary to the programs of adoption of digital literacy in education system. Digital literacy programs are the addition to the adequate programs within education system. It is also important to mention that, within the process of transformation of education, the use of digital information and electronic resources will increase, regardless whether the information were authentic (e.g. school web page) or joint alternative education resources are used (portals).

We suppose that it is possible to approach the development of digital literacy within libraries as a special project with very flexible organization, gradual structure and territorial division.

Unlike such system framework for the development of library system in whole and its connection to the information society, programs of electronic publishing and digitalization produce the best results as specific and organized activity of the institutions that can produce electronic publications as post-production process or continuation of standardized implied publishing procedure, i.e. the institutions or consortium of institutions that will digitalize part of resources. In both cases, particular attention should be paid to the issues of copyrights and conditions of use of resources and as well the source of proper technological standard of digitalization.

11.2. USING ICT IN EDUCATION

11.2.1. CONNECTION TO INTERNET

In the shortest time possible, institutional and human resources must unite in one “front” to struggle for urgent solutions concerning connection of all education and research institutions to Internet. This really must not be the problem that will be resolved only spontaneously through the elements of competition, fight for market etc. The need for the state to resolve this systematically, by involving all elements that may produce favorable result, must be clearly imposed.

Apart from ministries of education that are mainly responsible, one of the key driving factors must be the Information Society Agency. It must initiate key steps and find mechanisms to increase the number of education institutions permanently connected to Internet.

The state must provide higher speed of access and quality of services offered to the education institutions. Regardless it is certain that the Internet access charges will continue to fall, the mechanisms must be provided immediately so that each education and research institution can provide Internet access very quickly.

Costs of Internet connection will be financed from the state level, while the connection on local level (MAN, LAN) will be provided by the founders of education institutions.

Connection to Internet will be realized through lease of line by network operators and service providers. Funds for covering the costs of maintenance, stimulation of use of Internet technologies in daily work and improvement of local networks will be particularly allocated in the budget of education institutions. The amount will be expressed in percents of total budget revenue of (founders of) an institution, but in such way that it can absolutely cover the cost of lease of Internet line, maintenance and improvement of local

network of an institution (hardware and software), and engagement of a network administrator (provided that there is certain number of network units). Relevant obligations will arise from such way of financing for each institution, e.g. design of web site of an institution and basic database in accordance with procedures defined for that purpose. Information Society Agency will outline the procedures that will be taken into account during the process of certifying the institution.

11.2.2. RESEARCH AND EDUCATION NETWORKS

Key courses of action in this field are: activation of Research and Education Network and its integration into trans-European network NREN (National Research and Education Network).

It is necessary to establish stable financing source and adequate management for implementation of the first task.

Most part of financing will be provided by: Ministry of Communications and Transport (of BiH Council of Ministers), Government of Federation of BiH, Government of Republika Srpska and competent cantonal ministries. Part of the financing will be potentially provided by other network founders. Additional source of financing will be funds provided by members on account of network maintenance. This source will also come from entity/cantonal governments, but, in such way, it will contribute to increased interest on the part of members for the work of Research and Education Network.

Activation of Research and Education Network should begin from existing BIHARNET network (BiH Academic and Research Network). It is not necessary to create network, but to revitalize BIHARNET. Indeed, BIHARNET is our scientific and research network and it is not necessary to create a new one. However, BIHARNET, as is presently, requires serious re-engineering.

It is primarily necessary to replace group of founders who assume responsibility of financing the network and also its administration. Beside universities of Bosnia and Herzegovina, government should be explicitly involved in it (BiH Council of Ministers, Government of Federation of BiH, Government of Republic Srpska and cantonal governments). The founders can be any local education or research institutions, but also companies or other business entities whose interest is to support development of education and research network. All founders assume responsibility of financing the network. All founders must be from Bosnia and Herzegovina.

The network will be run by the Assembly of founders, name of which, tasks and statute should be adopted in accordance with the needs and demands of financing parties and service users.

Assembly of founders appoints Executive committee (its name, tasks, number of staff should be determined later) that will enforce the policy of Assembly of founders. The members of the committee will be engaged for a fixed term, after which the procedure of re-election will be applied. Executive committee designs operational plans (long-term and short-term) and ensures their implementation; decides on the organization of business; is responsible for relations with representatives of founders, then members, service users and public. One of the members of Executive committee is Executive director responsible for operational implementation of plans.

Education network will provide international connection and intercity links (Wide Field Network – WAN), while the development of MAN/LAN (Metropolitan Field Network/Local Field Network) networks and local networking in the cities will be done by university computer centers or similar institutions on local level.

The network will have its own infrastructure and communication lines will be leased. Network will be meant for transfer of data using TCP/IP (Transmission Control Protocol/Internet Protocol), version IPv6. Network will have broadband access (transfer

speed in Gbps) to the global research and education network that will connect all national research and education networks. Within Bosnia and Herzegovina, network will connect all major cities with speeds up to 1 Gbps. Other smaller towns will be connected with less speed: from 1Mbps, which is the minimum for meeting basic requirements of quality on-line transfer of multimedia information, and up to 155 Mbps. The exception will be some field schools and other institutions with inaccessible position and network infrastructure that is not built. The speeds there will be below aforesaid minimum of 1Mbps.

Teaching staff and researchers will have access to the network from their home.

For the purpose of integration into the trans-european network NREN, it is necessary to establish close cooperation with Trans-European Research and Education Networking Association - TERENA). The mission of TERENA association is promotion and development of information and telecommunication high quality infrastructure for the support to the research and education in Europe. The members are national and research and education institutions of Europe.

For inclusion into pan-European network, initiative FP5 EC to establish research and education network of Southeastern European countries is particularly important (South East European Research and Education Network - SEEREN). The main goal of establishing SEEREN is establishing southeastern segment of pan-European research and education network, in accordance with principles and practice used in implementation of GEANT network[17].

SEEREN project has five main goals:

- Establishment of infrastructure for connection of Southeastern European NRENs through two 34 Mbps international lines.
- Mutual connection of regional NRENs to main GÉANT points of presence in that field, located in Budapest, Athens, Ljubljana and Vienna.
- To keep leading in further improvements so that all regional NRENs will be capable of participation in GÉANT and be part of European "e-Science" platform.
- To reduce "digital divide" that still divides most countries of Southeastern Europe from developed world. To provide platform for cooperation of scientific and education communities of EU member countries with newly accessed countries and third-party countries.
- To use and disseminate achievements. To find additional sources of financing by EC, national funds in EC members and international organizations actively involved in the development in the region of Southeastern Europe, such as UNESCO and NATO.

Aforesaid goals have just defined needed courses of action in establishment of Research and Education network. However, in order for this network to use mentioned deductions, it is necessary to achieve quality financing and management. BIHARNET is the member of SEEREN, and action on implementation of previous goals should be continued through this membership.

Creating conditions for inclusion of the network into Central and Eastern European Networking Association (CEENet) also must be the course of strategic action. Basic mission of CEENet is coordination of international aspects of research and education networks in central and Eastern Europe.

11.2.3. Computer Capacities for Teaching, Scientific and Research Work

It is necessary to define realistic minimum of standards in the field of computer capacities of schools and faculties. False belief that the problem of equipment may be resolved by

[17] -South East European Research & Education networking , Newsletter No.4, September 2003 (IST-2001-38830)

donation of written-off equipment should end. This should be done immediately. After that initial impulse, it is necessary to perform annual adjustments of computer capacities according to the dynamic on ICT market. Mechanisms for proper maintenance of computer capacities must be provided, as well as financial sources for that activity. The models of alternative financing should be established in cooperation with local community, and also the models of tax and customs benefits in procurement of equipment. Schools and faculties will offer multimedia on-line services and contents, which standards of quality will be defined. It is necessary to implement the following:

- Sufficient number of computers in schools and universities: each school should reach the ratio of 15 students/computer, while each university should reach the ratio of 10 students/computer. These computers will be placed in IT classrooms and laboratories for simulation, while part of them will be freely accessed by high school and university students in assembly halls, corridors and free access rooms. Students will have Studomats available in all university buildings, wherefrom they will be able to access services like Student Service, Internet etc. Each faculty will have sufficient number of computers at disposal for education staff (1 computer/1 professor), and sufficient number of computers for administrative staff. Computers will offer the possibility of access to intranet, Internet and multimedia contents. It is necessary to define the standard of equipment needed. It is also necessary to provide effective use of the equipment through good maintenance service, and funds allocated for that purpose.
- Local network of schools and faculties: each school and each university will have their own local network. It is necessary to define the standard of communication equipment and servers needed.
- Metropolitan network of universities: each university should have MAN network based on optical infrastructure.
- Procurement of computers, network equipment, software and other accessories, including development of computer infrastructure with high performances (GRID technology) will be supported by high tax and customs deductions up to the level of total canceling of custom duties and taxes for the purpose. In addition, special paying deductions will be provided for high school students and university students and as well favorable loans through commercial banks, supported by the state.
- Equipment for presentations and other digital equipment: schools and faculties must have at disposal sets of basic equipment for presentations (projector, screen) and minimum of other digital equipment (each school should have one set, while each higher education institution at least three sets).
- Special equipment and software that enable persons with special needs to participate in the teaching process.
- Schools and faculties must use licensed software and open source solutions only, in accordance with the legislation on protection of intellectual property.
- Schools and faculties must have at disposal the needed system, application and education software, which standardized minimum should be defined first.
- Each school, faculty and university will have its web portal.
- Each university/faculty will have an item in its budget that is allocated for continuous investment into improvement of computer capacities and maintenance of existing ones.
- It is necessary to stimulate standardization of hardware and software, but not up to the level of limiting within single option. Strategy should be the following: Systems needed for daily operation of the institutions (equipment for managers

and administration, basic networking, servers, basic system software, software solutions for administration and management etc.) should be standardized as much as possible, while the selection of system must be completely in accordance with calculated cost/benefit relation. In that sense, it is necessary to adopt basic standards, if not on the state level then on at least entity and cantonal level. In adoption of standards, it is necessary to first make comprehensive analysis for the purpose of objective comparison of various „open source“ and „proprietary“ solutions. On the other hand, it is necessary to strive to more diversity of systems with which high school and faculty students have direct contact. High school and faculty students must have access to the specter of technologies that is as large as possible. Education itself must not limit too much their view to the possibilities offered by various technologies. Therefore, systems directly used in teaching should be based on various hardware and software platforms – it is necessary to consciously deviate from optimization by cost/benefit relation, although it implies increased costs of maintenance etc. Since open-source solutions have not been present that much, they should be promoted, and it is necessary to work on training of university and high school teams qualified in consulting related to those technologies. It is necessary to create favorable conditions for procurement of „proprietary“ solutions for the needs of education process through stimulation of opening state-level branch offices of large world companies that deal with ICT, and through opening of permanent process of negotiation with those companies as well.

11.2.4. ELECTRONICALLY SUPPORTED LEARNING

Good connection through Internet of the research and education network will significantly increase capacities of education institutions in their basic performance. Under such circumstances, long stay of students in school is not necessary as a condition of interaction between teacher and student. The interaction may be achieved from student's home or from workplace if it relates to specialized education.

Electronically supported learning, as an important aspect in the "society of knowledge" will take more and more important place because of growing pressure on education institutions to increase education capabilities without increase of budget. Only the institutions with good capacities in equipment and staff will be able to respond to such demands and impose themselves in education market. In order to enable transition from classical to the combination of classical and electronic education painlessly and as fast as possible, it is necessary to have equipment for support to electronic learning (Internet-based platforms for distance learning, special devices and tools for multimedia information processing etc.), and train teaching staff for the development of multimedia contents.

In order to implement the aforementioned, particular attention should be paid to the organized development of electronic education content and different forms of electronic education. One of the ways of implementation of these tasks is establishment of centers or institutes at universities, or independent education centers that will be able to provide technical, organizational and didactic support to the development of distance, i.e. electronic education. Training and assistance to the teaching staff in development of electronic education content, administration of web platforms for eLearning, and handling equipment available should be the main tasks of these centers.

It will be necessary to initiate a number of development programs and projects that will lead to this goal, and that will be implemented by already established or new centers/institutes for development of electronically supported learning.

It will be necessary to implement at least the following:

- Multimedia education centers for the support to learning: each university must establish center/institute that will have at its disposal necessary resources of equipment and staff, and for providing technical, organizational and didactic support to the development of distance learning. The standard of equipment needed should be defined and regularly updated in accordance with technological progress. The network of Multimedia education centers will be developed in private and public sector that will offer certified eLearning content pursuant to recognized standards.
- Quality multimedia services and content: all universities and faculties will offer 24-hour on-line access to information, quality multimedia services and contents. The quality of whole content will be defined by the relevant authorities (University Publishing Committee, Standards and Assessment Agency in Education for Federation of BiH and RS, Curriculum Agency).
- University Publishing Committees, in addition to the members delegated by multimedia education centers for the support to eLearning, will certify eLearning programs and content, and outline standards of their quality. These contents will also be included in credit system of education institution.
- The development of electronic education content will be stimulated through various measures (certification and copy-right protection, financial supports to teaching staff and teams, awarding additional points in advancement to higher level academic title etc.).

11.2.5. EMIS

11.2.5.1. EMIS FOR PRIMARY AND SECONDARY SCHOOLS

Strategic guidelines for the change from the existing situation into the target one may be abridged in general as follows:

- It is primarily needed to define and accept single platform of development of EMIS for primary and secondary schools. Having in mind that the development and implementation of such project is a long-term process, it is necessary, as a prerequisite for initiation, that all relevant actors of education system, and other parties of authority from municipal to state level, recognize the need for the development of EMIS and provide unquestioned support for its development and implementation. Existing EMIS Project, supported by the World Bank, has resulted in a possible but insufficient solution. However, it may serve as an excellent basis for further development. Stakeholders of creation of a single platform of EMIS development should be the entity ministries of education. These two ministries should create joint platform of development of standardized EMIS for primary and secondary schools, starting from the results of World Bank EMIS Project. Standardized platform will not necessarily lead to the development of single and unified software, but it must set: (i) clear standards that any future solution must fulfill, (ii) open standards for exchange of information, and (iii) joint platform for leading and financing development and maintenance of EMIS.
- Defining of financial sources. The development, implementation and maintenance of EMIS must have stable model of financing from competent ministries. Maintenance of EMIS must be component part of budget. Based on defined platform, it is necessary to clearly restructure the system of financing in competent ministries.
- Phase development and implementation of certain modules of EMIS. Subsystems and processes that will be recognized, and possibilities for

their improvement by implementation of certain modules of EMIS, should be specified by priorities for implementation with clear definition of final design of project documentation needed, as well as interface for mutual communication. Based on this definition, it is necessary to design final project documentation for individual modules upon which the development of solution for each module may be sought as ready or ordered. All new modules must be compatible with the existing one, including ones that already have been implemented through the aforesaid World Bank EMIS Project. Phase development may result in various software solutions in entities, and even on cantonal level, but all solutions must be harmonized with the standards defined in joint platform of EMIS development so as the efficient exchange of information is ensured.

- Improvement of knowledge of users. Immediately, regardless of the pace of development and implementation of EMIS segments, it is necessary to initiate comprehensive education program for future users. That program must enable them wider general information science knowledge, better understanding of advantages offered by use of EMIS from the standpoint of their regular activities, and as well better understanding of advantages offered by use of EMIS from the standpoint of improvement of management in education.

11.2.5.2. EMIS FOR HIGHER EDUCATION INSTITUTIONS

The development of EMIS for universities should be set as a process, not as a project; i.e. it is necessary to talk about informatization of universities. This process needs to be:

- clearly defined, based on experiences from all BiH universities so far (existing efforts made by universities should be analyzed and create single developmental frame), and
- institutionalize in universities (it is necessary to clearly define stakeholders of informatization in each university and provide it with stable budget for the work on informatization process).

Since the development of EMIS for a single university is a large investment, it would be ideal to initiate development, based on previous assumptions, of a single model EMIS that may be used in all universities. However, such a scenario is not likely. Realistic scenario is rather creation of a single development platform that would take into account the needs of all universities. The development of software solutions in any university based on joint developmental platform may result in acceptance of the same solution by another university, which will then significantly lessen the price of the development and maintenance of such system.

It is first necessary to create a body comprised of representatives of all interested universities. That body should define joint platform of development of university EMIS. The platform should not necessary impose single software solutions for all universities, but it must clearly define: (i) standards that any future solutions must fulfill, and (ii) open standards for exchange of information. The platform must take into account specific needs of all universities involved, so that the development of software solution for any involved university can be initiated based on it.

In development of a single platform, starting point should be existing systems that are operational or in phase of development. Transfer of data should be provided for operational systems, while the projects of systems in phase of development should not be terminated, but it is necessary to change project tasks in accordance with single developmental platform.

Based on adopted platform, a university initiates development of software solution. In this phase is possible that several universities join for the purpose of reduction of development and maintenance costs. Professional software company selected on public tender may design software solution based on adopted platform, or a university can organize its development team. All these decisions are at the discretion of a university.

Regardless of scenario of development that a university chooses, competent ministry should provide initial investment for development and budget line for further development and maintenance. The only condition for this should be adoption of a single platform of development from which it is clearly seen what exactly is being financed.

11.2.6. LIBRARY SYSTEMS

All affairs, services and total function of library system (LS) and library information systems (LIS) completely correlate to the functions of education systems and education network. Libraries are the institutions meant for support to the education system and scientific development.

Library sector will use LIS/OPAC single system of cataloguing of library resources, based on protocols of establishment of publicly available catalogues. This system will equally include all library institutions, i.e. their catalogues.

LIS/OPAC single system of cataloguing of library resources is based on protocols of establishment of publicly available catalogues. This system will equally include all library institutions (public, faculty, specialized, important school libraries, i.e. their catalogues. These systems have been existing in library system since early seventies. It is assumed that there are around 3,000 systems, i.e. that there is not a single country that has not networked the most important library resources into publicly available computer-managed catalogue. Since it is about system, its realistic architecture can be adapted to the function and coverage of libraries.

LIS/OPAC includes cooperation, coordination and mutual creation of catalogue (joint) resources (databases), then system administration, education of users, development and expansion of system, exploitation of system, international cooperation and migration of technological platforms.

The entire field is well covered by international standards and protocols of processing (OPAC is completely based on sets of ISBD standards of catalogue processing like ISO 2709:1974: 2000, Z39.50 /recently ISO standard also/ and by set of ISO standards for ILL).

There is a specific institution in Bosnia and Herzegovina, tasked with development and administration of library information system. COBISS is a registered institution founded by universities in Sarajevo, Mostar (East and West), Banja Luka and Tuzla and the Institute of Information Science in Maribor. This system should be supported and improved so that it can become the core of education system, part of education network of Bosnia and Herzegovina and point of contact of information society as a society of knowledge.

Besides, most libraries, especially education and specialized libraries, should permanently provide the presence and use of foreign (bibliographic or factual) databases and as well connection to the international library community. Libraries must be key points of contact for access to aggregate bibliographic systems.

Reference function of library information science system is contained in use of foreign aggregate databases that are available to the users by use of standard procedures used in libraries or OPAC catalogues.

The presence and use of foreign (bibliographic or factual) databases in certain education and cultural environment, and connection of LS/LIS with international library community

are also among basic functions that particularly education and specialized libraries must have.

In this sense, LIS is point of contact for aggregate bibliographic systems (e.g. Eifl, Ebsco, ISI Web of Science SCI, Dialog ...), and that includes administration of system, control and maximum payment concerning large amounts of subscriptions to individual systems. Such services are also viewed as component part of education and developmental networks.

Currently, for all users in Bosnia and Herzegovina and especially education sector, on-line Internet search of databases of aggregate databases «Ebsco» Publishing is operational and administered by national and University Library of Bosnia and Herzegovina, through EIC BiH (Electronic Information Consortium), ad-hoc consortium of 14 BiH libraries. Such development should be further supported and stimulated.

11.3. QUALITY AND STANDARDIZATION ASPECTS

There will be an information society agency at BiH level that will coordinate and verify all activities related to the issues of quality and standards for ICT and ICT in education as well (Education for Information Society and ICT for Education). Within the Agency, there must be a separate organizational unit for the field of quality and standards.

There must be roof professional association of information science engineers on BiH level. Establishment of a roof professional association of information science engineers for the whole BiH will assist and facilitate certain existing and newly established associations to become members of relevant world and European associations. This Association should stay out of the future agency for information society and it should also follow European (CEPIS) activities related to EUCIP program.

The state should assist financially and legally to the membership of Association of ECDL information science engineers of BiH into CEPIS, which provides access to ECDL program.

It is necessary to come into such a situation wherein all information science elementary and high school teachers will have completed proper schools for information science teachers (Pedagogic Faculty), i.e. certified programs of re-training. It is necessary to set clear criteria for certification of such position (e.g. full ECDL/ICDL or basic MOS).

As for the copyrights (issue of use of licensed software), legislation should be harmonized with world standards.

Contracts with world software manufacturers should be signed on the state level and legalization of software in education and research institutions should be agreed as well as reduced price of licensed software for school and faculty students.

Procurement of equipment should be standardized to the maximum. ICT equipment (hardware) for education and research institutions should be primarily procured at certain suppliers who will acquire that right on the basis of tender announced annually by the state. The state must support this process also in such way to give tax exemptions (customs, turnover tax etc.) for the procurement of certain ICT equipment, primarily computers for personal use of school and faculty students, and education staff, through education institutions.

Hardware in all school and scientific and research institutions must meet international standards on environmental protection and ergonomics (e.g. TCO standards).

Education form the field of standards and quality should be made more popular by observing the World Day of Standard and Quality.

The register of scientific and research work should be established for BiH (like SICRIS in Slovenia), with the implementation of CERIF.

It is necessary to start at least one BiH magazine for each of scientific disciplines related to ICT that will be internationally recognized and indexed.

In the field of connections, quality and standardization are of particular importance. If they are not implemented, connection to other NRENs will not be implemented. Internet connection mostly includes certain level of QoS (Quality of Service) and known standards that are valid in the field of communication.

In order to implement connection to other NRENs, it will be necessary to meet other requirements and standards, beside technical ones. Before all, these are legislation and regulatory and political environment in which network will operate. These elements will be subject to continuous improvements during establishment and work of Research and education networks. Initiators of key activities will be the founders, network steering board, agency for information society (establishment of which is under way) and agency for standards and evaluation.

In order to realize targeted vision and ensure satisfactory levels of quality, it is necessary to monitor all the activities and evaluate them by defined aspects of quality and standardization. This part of the activities will be performed by the agencies and other authorities that already act in this field or which establishment is proposed in this and other documents (Agency for information society, Agency for standards and evaluation, Agency for curriculums).

It is necessary to maximize the efforts related to standardization:

- To translate all basic dictionaries JTC1 (ISO & ISO/IEC 2382), while the provision of all standards related to ICT and quality for the needs of education institutions should be subsidized.
- BiH must register its cultural specificities (ENV 12005, ISO/IEC 15897).
- BiH must follow the activities of ISO/IEC JTC1 SC36 and stimulate the implementation of their standards.
- BiH must be the member of CEPIS and accept and implement its programs such as EPIC, EICLP, ECDL, CoC, EUCIP....
- BiH must be the member of IFIP, and it especially must follow the work of TC3 Education.
- ICT associations from BiH should be the members of IEEE.

eGovernance

Transformation of public administration in the direction of intensive and widespread use of information and communication technologies (toward “electronic governance”) is one of the key segments of the overall process of building *the information society.* Such a transformation would provide citizens, business partners, non-governmental and other institutions with permanent access to its services as well as with simple, efficient and cheap business operation. Such public services would significantly contribute to increasing efficiency of business systems and reducing business operation costs. Introduction of eGovernance would also have important “side effects”, such as: promotion and establishment of standards, creation and enhancement of awareness of individuals and business systems on the use of and potential of modern technologies, increase the level of confidence in security and reliability of these technologies, protection of privacy etc. In this eGovernance Development Strategy for 2004 - 2007 (inclusive), identified are key courses of action, activities and measures that would build a systemic and comprehensive infrastructure for governance development and implement a larger number of fundamental projects related to informatization of public services following European initiatives (eEurope 2005, before all), decrease the development gap in relation to the developed Europe and thus create pre-requisites for integration of Bosnia and Herzegovina into the European Union by 2010.

Courses of action determined in this Strategy are oriented at the following segments within the administration: re-engineering the public administration, technological and developmental basis, communication and IT infrastructure, inter-operability, security, fundamental registers, informatization of joint and specialized functions of the administration, e-democracy, electronic services as well as portals and access points. For every of the said segments, provided are analysis of the current situation in Bosnia and Herzegovina, current trends, desired objectives as well as activities and courses of action. Considerations on the above have generated the development projects and measures, i.e. the Action Plan. In order to monitor the success of implementation of the Action Plan, envisaged is the use of a group of internationally standardized indicators.

This Strategy sets ambitious objectives. There are several factors upon which the success of strategy implementation will significantly depend. The key factor is absence of genuine commitment on the part of relevant decision-making actors at certain administrative levels and their readiness to give maximum support to the implementation of this Strategy. Another critical factor is the insurance of the necessary number of quality staff that would drive and implement the eGovernance development process. At the moment, there are very few, which will require special measures and strategy of action on the part of office holders. Investing in the eGovernance development must be a priority at all government levels. In addition, the necessary organizational measures must take place to form appropriate bodies/organizational segments at all levels of administration that should implement the defined policy and informatization strategy. Of paramount important is the readiness of all administrative bodies to mutually cooperate, exchange information, experiences and ”good practices” as well as be ready to resolve similar or identical problems by combining their resources, knowledge and other potential. The emphasis must be placed on coordination, not subordination, and on synergy and the most efficient use of all available resources. It is also greatly important to create awareness and disseminate information on the potential and advantages of informatization of administration, among public servants but also among service users (business systems and citizens).

12. GENERAL OVERVIEW

12.1. INTRODUCTION

Information and communication technologies (ICT) represent a generator of changes and a development basis of modern societies and their economies in the 21st century. Their use diminishes obstacles in communication, business or service delivery. It is evident that current technological development places a need for extensive use of ICT in all sectors of the society and to process information as one of the elementary resources necessary for doing business and decision making which is why their maximum use must be ensured in the world of public administration. The present mode of operation of public administration, its organization and legislative framework cannot ensure the necessary efficiency or quality of its services. By improving efficiency and quality of public administration services through use of information and communication technologies we would significantly influence the overall trends, as well as the economic and any other form of prosperity across Bosnia and Herzegovina.

There is an undoubted need to achieve a functional and effective public administration. Several studies, proposals, laws and projects have been carried out to get to radical and substantial changes in today's functioning of the administration. Significant progress has been made, but that is still not enough and it does not meet the needs of clients in terms of quality, speed and price of services. Because of the specific circumstances in Bosnia and Herzegovina, the workload is steadily increasing as well as the number of visitors in public administration. The administration must adjust itself to the needs of clients and must provide the citizen (service user) with the option of doing business in as quick and as simple manner, if possible from home or from work. It is necessary to create conditions for a prompter response to users' requests, as the prevailing opinion today is, and facts indicate that too, that the administration is sluggish, inefficient and very expensive. Use of new technologies is at a very low level. Tradition, cultural milieu, history of relations between politics and administration and external factors have significant influence on the state of public administration. Apart from these factors, mentioned should be the transition process, situation in and level of private sector development, relationship between the society and the administration etc.

Public administration reform as well as introduction and use of modern technologies are one of the priority objectives within overall process of building and functioning of the administrative system in Bosnia and Herzegovina. The primary intent is to, in line with changes in the economic and political domain and the reorganization of the overall structure of the administrative and management system, determine an entirely new position, organization and business of the public administration, aiming to ensure prompter, cheaper and higher quality of services to citizens. The reorganization of the administrative system structure needs to be conducted so that the new organization of all services will support the expected changes creating a more certain and a more modern vision of the future of Bosnia and Herzegovina.

It is important to underline the difference between terms "electronic government (e-Government)" and "electronic governance (e-Governance)". The term "electronic government" does not refer any longer to technical set-up which through ICT achieves a more efficient and more transparent work of the administrative bodies, while the term "electronic governance" refers to the overall process which often includes reengineering of the business process as well as reform in a far more significant meaning than simple introduction of information and communication technologies into the work of administration/government Transition process and introduction of 'electronic' governance in BiH, under these circumstances, should be perceived as an evolutionary process where speedy changes and delays occur, which are necessary so that these changes can be understood and executed.

If Bosnia and Herzegovina is to be admitted into the European Union by 2010, it must undertake radical reforms in the field of public administration and transfer to the concept of eGovernance.

12.2. About This Strategy

The eGovernance Development Strategy was prepared on the basis of Memorandum of Understanding signed between the Council of Ministers of BiH and UNDP, Government on-line initiative (G7, 1995), *eEurope Action Plan* (Feira 2000), Plan *eEurope+* for informatization of all EU candidate countries, Global initiative for information society development under the auspices of the United Nations, *Agenda* for information society development adopted by the Southeast European countries and finally the Information Society Development Policy of Bosnia and Herzegovina.

Experiences of countries that made similar strategies and recommendations of the EU demonstrate that, if the realistic and total political agreement is reached regarding the necessity of informatization of the society, and room left for participation of all (different administrative bodies, non-governmental organizations, scientific and professional institutions and individuals, private sector) and in parallel with that incentive given to raising awareness on the significance of ICT in the overall social development, that ensures the quality and realistically feasible Strategy.

The eGovernance Development Strategy is an elementary document on courses, key development factors and activities that will be undertaken at state, entity, cantonal and municipality administrative levels as well as at Brcko District level, related to overall use of information and communication technologies and reconstruction of public administration between 2004 and 2010. This extraordinarily complex task can be fulfilled only through systematic and organized approach, where drafting of a strategy takes the first place.

12.3. Field of eGovernment

12.3.1. Field in Focus

The term 'Government' entails the Council of Ministers of Bosnia and Herzegovina, entity and cantonal governments, ministries and local administrative bodies. With the introduction of eGovernment we would significantly increase the efficiency, cut the costs, expedite administrative procedures for citizens and economic parties and simplify communication. Building eGOVERNMENT is primarily a reformist and then technological endeavor.

In a larger context, the objective is to achieve the concept of 'state in one place' (all business done from one place), as it is done in very developed countries in accordance with their efforts to transform to information society. Budgetary pressures and quick expansion of new information and communication technologies force administrations across the globe to conduct "reengineering" of it's method of operation. Several projects appear aiming to give new meaning and role to public administration, from the stance of "user" and to follow objectives of "integrated service delivery ".

Transformation of public administration is one important segment of the overall process of building of the *information society.* Information and communication technologies, with their potential in collecting, storing, transmitting, editing, selecting and presenting all types of information are the essential and necessary condition for a successful economic development of the society and advancement of public affairs via quality and effective use of knowledge. Knowledge and intelligent use of information become the key factor of new business doing, which is why oftentimes the expression "society of knowledge" is used instead of "information society". Use of new technologies at the developed world level is the primary prerequisite for joining that world, which is why great efforts must be invested, primarily in the education system, complementary education and use of the aforementioned technologies.

12.3.2. Developmental Role

Through use of information and communication technologies, improved should be the quality, availability and speed in which the public administration acts to meet citizens'

needs and efficiency of the public sector institutions should be increased. Their extensive use will increase efficiency in information exchange, at horizontal and vertical level, between users, local administration, cities, cantons, entities and the state, in both ways and with reduced price of public services and overall costs of citizens and businesses. Additional investments of the public sector into the information and communication technologies will demand significant participation and involvement of the private sector (primarily that part dealing with information and communication technologies), which entails opening of new, highly professional positions in the society and enhancement of the ICT sector in entirety. Introduction and implementation of the eGovernance concept sets high demands for security, reliability, quality, standardization etc, which will indirectly influence expansion in use of advanced solutions in other sectors. Using new solutions and advantages they offer, they will demand and will encourage the process of digital literacy of the larger circle of citizens thus enhancing the general work potential and capacity of the society. Overall result will be the general increase of the knowledge level and degree of use of new technologies, including competitive potential of the BiH enterprises, i.e. accelerated economic development, increase in employment and opening of new jobs and markets. Therefore, the role of eGovernment development is important in the overall development of the society and it is the necessary condition in building a modern society.

Additionally, eGovernance will advance the democratic dialogue with citizens and ensure their involvement in democratic processes, increase transparency of public administration bodies and enhance confidence of citizens in the institutions and office holders in Bosnia and Herzegovina.

12.4. TRENDS

Modern world is characterized by the processes of **globalization** and liberalization, that erase regional, spatial, cultural and other delimitations and that, on one hand, stimulate competition and on the other commit businesses, regions and countries to cooperation and connecting.

Intensive **investments into new technologies** are typical of all developed countries. For example, Estonia invested 3.21% of its national income in 2000 into IT development; Czech Republic invested 2.74%, Hungary 2.50%, Slovenia 1.64%, while European Union countries invested on average 2.71% of national income. In 2000, Slovenia invested 123 euros per inhabitant into new technologies; Czech Republic invested 119, Hungary 90, Estonia 82, European Union countries 514 euros per inhabitant. Slovenia had 111 computers connected to Internet per 10000 inhabitants, Czech Republic had 140, Hungary 121, Finland 1024, and European Union countries 222 on average (EITO 2001).

Research shows that most countries of the world have created **eGovernance Development Strategy**, while some countries have advanced in that regard. For example, Great Britain plans to make all public services available *on-line* by 2005 (*www.ukonline.gov.uk*), while Ireland, USA, Japan, EU countries, Norway have similar timelines. Majority of the aforementioned countries have networked public institutions at all levels, thus providing via Internet all more important public services to citizens, organizations and businesses. Majority of services are available 24 hours a day, every day of the week, all year round.

In order to start with **public administration reform**, the most extensively possible support of all relevant political parties in Bosnia and Herzegovina must be gained. Decentralization must take place, from entity and cantonal to local level of those administrative bodies which are in direct contact with citizens. Gradually, services that do not present the core of state administration should be deferred upon the private sector (with strictly defined rules and conditions) wherever this proves to be an economic and efficient solution. Reform and introduction of eGovernance would result in simplified, practical, transparent and efficient structure of ministries, cantons, municipalities, organizations and institutions. Mechanisms of internal and external communication would be advanced. Use of information technologies

would ensure expedited collection, processing and distribution of information as well as modern organization and quality human resources management. Functional reform should be conducted, services and process of public administration identified and reengineered, all the while taking into account the potential of new technologies while avoiding mechanical copying of the existing methods of work and functioning of public administration with the use of partial, computer supported solutions.

Using Internet in the work of administration is the cheapest and the most efficient way of obtaining client services. Advantages offered by Internet when working from home or work are obvious, therefore the population using it should be accommodated and provided with the opportunity to get their business done in that manner. Placing services on the Internet provides the local, city, cantonal or entity administration in BiH with the opportunity to disburden traditional windows and do its work in a simpler, easier and quicker manner. Aiming to promote use of eServices, users will be offered benefits or discounts if they choose this type of communication to complete their business. Access to these services should be implemented though the public administration's Internet portal.

The general tendency, particularly present in the European Union, is greater cooperation with the immediate and distant neighbors. Integration takes place in an expedited manner; delimitations are erased, primarily within the most developed part of the European Union. At the same time, joint planned actions took place to achieve quick connections in all key joint matters. Similar tendencies should be supported in Bosnia and Herzegovina and larger region, but by not imposing solutions 'from above' but rather promoting and encouraging cooperation, exchange of experiences and good practice between relevant parties, on horizontal and vertical levels. This approach will provide initiative at 'lower' levels and the use of the most quality and most economic solutions across Bosnia and Herzegovina, while poor solutions and poor choices will be easily visible and their actors will bear the risks and consequences of such choices. In order to achieve this goal, it is necessary to work on defining and standardizing requests, providing room for competition and use of several applicative solutions (in principle, for less complex systems). Considering the IT-related reality in municipalities, cities, cantons, entities and at the level of Bosnia and Herzegovina, it is necessary to initiate a process of creation of associations of local and regional IT elements of public administration, within which the said cooperation and connecting would take place. Through IT sectors/departments/agencies related to organizational units of the public administration it is necessary to conduct 'interdepartmental' coordination of activities in organizational units of the public administration, as well as coordination with external parties.

Experiences in foreign countries show that introduction and use of main principles of control and quality assurance are effective in terms of increasing efficiency in the public administration's performance and reducing corruption at all levels. However, in order to successfully apply the principle of control and ensure quality, two pre-requisites are necessary: commitment of everyone to introduce system of quality in public administration and well chosen methodology of introduction. Changes in the work of public administration, primarily in ensuring quality, are most often initiated from inside. The key to successful implementation of principles and method of achieving quality is undoubtedly related to leadership. Lack of commitment on the part of leaders in ensuring quality is the primary cause of failure in implementation of the system of quality in any public administration.

Transformation of public administration in accordance with modern trends imposes the need for introduction of managerial approach and certain activities in the private sector. Such practice is based on public selection, agency approach to management, as well as experiences and techniques of management in profit and non-profit organizations.

13. CURRENT SITUATION

13.1. ORGANIZATION AND WORK OF PUBLIC ADMINISTRATION

Public administration offers services to citizens in 146 municipalities, 10 Cantons, 2 Entities, Brčko District and at the level of the state of Bosnia and Herzegovina. Problems identified in the work of public administration at all levels are as follows:

- 13 assemblies pass laws (which are contradictory in some segments),
- Administration does not operate according the European standards,
- Principles and practice of work at the level of one municipality or canton are different from those in another municipality, canton or at FBiH level,
- poor insight into business and operation,
- attempts to integrate and connect databases are insignificant (with the exception of some projects at the level of Bosnia and Herzegovina, e.g. CIPS, SBS, Customs and others),
- vertical and horizontal electronic communication is absent,
- due to absence/lack of adopted hardware/software standards, different operational systems, computer programs and data bases are in use,
- there is no global plan of informatization of the state administration; existing systems operate in isolation, not connected and they cannot provide citizens with the necessary information,
- outdated equipment, which does not provide for quality networking,
- minimum use of modern means of communication (video conferencing, *e-mail*, ...),
- administration's web pages do not offer many services to citizens; except for information that is not often updates, there are printable forms posted occasionally,
- in essence, the concept of eGovernance is not functional.

13.2. DEVELOPMENT INITIATIVES

Development of Bosnia and Herzegovina in the direction of a democratic and developed society, ready to partake in European integration process and become part of integrated Europe is a complex task, considering the consequences of the war, processes of transition and profound transformation of the society as a whole. These processes take place here, judging by their features, as part of dramatic global changes. Most countries undertake efforts and coordinated initiatives aiming to optimally adapt their economies and social structures to new trends and market demands. Those initiatives fit in global and regional initiatives and objectives (e.g. millennium goals: fighting poverty, hunger, illiteracy, destruction of human environment and gender inequality, global information society development initiative, eEurope initiative etc.). In Bosnia and Herzegovina, several steps and developmental initiatives were taken, directly or indirectly aimed at the information society development and necessarily eGovernance, for example:

- Peace Implementation Council, at its session in Madrid on 16 December 1998, gave priority to the creation of a professional and depoliticized civil service in order to ensure selection, management, career advancement, compensation and social benefits for civil servants in the manner promoting professionalism and political independence.
- BiH Working Group for Public Administration Reform was formed as well as the Office of BiH National Coordinator for Public Administration Reform.
- Adopted was the *Strategy of Bosnia and Herzegovina for Reduction of Poverty* (PRSP), a development strategy in essence, which also includes aspects of informatization of society.

- Conducted was analysis of the current state in informatization and potential of using ICT in different fields of BiH society as well as of readiness of Bosnia and Herzegovina to build the information society – within projects of the Forum for Information and Communication Technologies, with the support of UNDP.
- *Telecommunications Policy* in Bosnia and Herzegovina was adopted
- Information Society Development Policy in Bosnia and Herzegovina was adopted
- Several relevant laws were adopted (Law on Communications, Law on Information, etc.) and several administrative bodies formed (Communications Regulatory Agency, Statistics Agency at the level of Bosnia and Herzegovina etc...).
- Project 'Systemic Review of Public Administration in Bosnia and Herzegovina' is underway, supported by the European Commission.

As part of larger development initiatives in Bosnia and Herzegovina, initiatives for reform and development of public administration were started. In support of that process at BiH level, according to the decision of the Peace Implementation Council from 28 March 2003, an inter-governmental working group for public administration reform was established.

In 2002, the High Representative enacted the Law on Civil Service in Institutions of Bosnia and Herzegovina at BiH level, subsequently adopted by the Parliamentary Assembly of Bosnia and Herzegovina. Also, a number of complementary laws were adopted in the domain of public administration reform, at state and entity levels. In addition, the Council of Ministers of BiH decided on establishment of the Civil Service Agency as a form of institutional responsibility for implementation of public administration reforms.

13.3. GOVERNANCE DEVELOPMENT PROGRAMS

In Bosnia and Herzegovina, several projects are planned at different levels of administration aiming at informatization of administration.

Government of Republika Srpska adopted a Public Investments Program 2004 – 2006, comprising five IT projects. Brief description of these projects follows.

- *Municipal Registry Offices*. Project's objective is to automatize issuance of birth, marriage, death and citizenship certificates.
- Local administration reform and introduction of e-Government.
- *E-Municipality information system*. Project proposed uniform methodology and standards to create website solution for all municipalities.
- *Information system-standardization, organization, systematization,* with the aim of creating conditions for creating of a unique database, comprising basic information on standardization, organization, systematization and document management.
- Information system – real estate database.

As there are no appropriate IT networks in certain ministries of the Federation of Bosnia and Herzegovina government and as a lot of time is lost in contacts with the administration when requesting certain information, there is a commitment and initiatives to establish agencies, departments and units for informatization at certain levels of administration, to provide permanent education to staff through programs of specialist development, visits to conferences, seminars, fairs etc.

13.4. REGIONAL INITIATIVES

Significance of information and communication technologies for development is recognized at regional level. As part of the Stability Pact for Southeast Europe, sectors of security, economic development and informatization have been identified as particularly important. Three "working tables" were formed; one for each of the mentioned sectors, to achieve expedited and coordinated regional development in the mentioned domains. Working table for promotion of information and communication technologies in the region generated the initiative for

electronic Southeast Europe (eSEE initiative), aiming to follow European initiatives eEurope and eEurope+. Countries participating in the initiative (Albania, Bosnia and Herzegovina, Croatia, Serbia and Montenegro, Macedonia and Moldova) adopted and signed on 26. 10. 2002 in Belgrade a harmonized plan "eSEEurope Agenda for the Development of the Information Society", aiming to act in synergy and implement the information society in the region. The Agenda contains a plan of concrete actions in fields of:

- Ensuring organizational and institutional framework for information society development,
- Legislation – legal framework for support to information society development,
- regulations (liberalization of policy and strategy for communications infrastructure and related services),
- promotion of information and communication technologies.

Among others, Agenda envisaged that all countries of the region will adopt national information society development policy and strategy (deadline was set at 30.10. 2003), establish appropriate bodies at state level responsible for implementation of national policy and information society development (deadline set at 30. 10. 2003).

13.5. Current Situation in eGovernance Development

13.5.1. Legislative and Regulatory Environment

Full effects of the use of information and communication technologies are based on certain laws and regulations. Established should be an efficient mechanism of adoption of international norms and standards for the field of information and communication technologies and public administration. Priority of Bosnia and Herzegovina is to harmonize BiH laws and regulations with directives and recommendations of the European Union. Legislative regulations on public administration should be, first and foremost, promoting new commitments to consistent implementation of the principle of depolitization, transparency, professionalism and efficiency in its work.

Certain laws have already been passed and are now being implemented. Some are being revised and the Council of Ministers is preparing their amendments in this year, for example:

- The Law on Protection of Personal Information (Commission for Protection of Personal Information has been formed),
- Law on Central Records and Information Exchange,
- Law on National ID Number, Law on Temporary and Permanent Residence, Law on Identity Card,
- Law on Communications. This law, the Telecommunications Policy of Bosnia and Herzegovina, establishment and work of the Communications Regulatory Agency mark an important step forward in the liberalization of the telecommunications sector,
- Law on Freedom of Access to Information in FBiH 32/01,
- Copyrights Law (Official Gazette of SFRY 19/78, 24/86, 21/90, and Official Gazette of FBiH 7/02 and correction 32/02.),
- BiH Law on Public Procurement (pending adoption).
- Activities on the Law on Digital Signature and Electronic Business are underway.

Legal basis needs to be ensured for the support to and for uninterrupted use of information and communication technologies in administration, among others: adoption of the European Convention on Cyber Crime and adoption of appropriate laws, adoption and harmonization of other laws harmonized with 'acquis communautaire'.

13.5.2. General Situation in Use of ICT in Administration

Staff computer literacy. 45% of administration staff know how to use a computer, while in the total number of staff, there is only 5% of professional IT staff employed in the IT or equivalent services. Staff employed in the administration has appropriate education, most frequently acquired some years before. There is an evident need for permanent additional education of all administration employees in the parties related to their profession as well as in the field of new technologies.

Internet connection. According to the World Bank research, Word Development Indicators, Washington, April 2003, there were around 48 computers per thousand inhabitants in BiH. Out of 61% of institutions with Internet connection, only 4% have cable 2 - 11 MB connection to Internet. Institutions with Internet access use 40 different ISPs. Formally, there is limited presence on Internet, via government's Internet pages, which in most cases serve as public sources of information.

Jobs. At this moment, our administration does not recognize new jobs such as: "*system* administrator", "manager/data security officer", "*web*-journalist/editor", "*web*-administrator", etc. or new jobs related to new types of enterprises ("*Internet service provider*", "*Use service provider*" and others).

Access points. There are no official places where one can get official, accurate and verified information on economic entities, state administration, key personalities, state of enterprises and organizations in terms of credit worthiness, loans, solvency, competence, expertise, history etc. Public institutions do not use ICT to provide transparent information on annual investment plans, procurement procedures (*e-procurement*, electronic procurement) etc., thus ensuring that everyone has the same conditions under which they offer their products or services.

Service and regulation quality. According to the research Word Development Indicators (April 2003), Bosnia and Herzegovina comes last in the list of 60 observed countries in terms of quality of administrative regulations. One obtains information very slowly and a lot of time is lost in contacts with the administration. Citizens conduct most transactions with local administration (around 80%). Managers of mid-level companies in BiH lose around 23% of their working time in contacts with state and local administration.

Staff structure. In order for the public administration to be efficient, it is necessary to reform it as it is too bulky and inefficient. According to the research conducted by the RS Ministry of Administration and Local Self-Governance, it is evident that the number of employees in local administration is higher than in developed countries. On average, there is one employee in local administration per 367 inhabitants, while in developed countries this number is around 2000. Qualification structure is also inappropriate as local administration employs only 27.5 % of persons with university degree. Age structure is disadvantageous as few younger staff is employed: total of 5.4% are below 30, 44.7 % are between 40 and 50 years of age, while, 22% are above 50.

FBiH Statistics Institute researched the functionality of the public administration in FBiH. It established that administration is too bulky and inefficient, especially in Sarajevo Canton and Posavina Canton (Orašje). On average, there is one employee in public administration in FBIH per every 164 inhabitants.

Obstacles and limits. One can anticipate the following problems upon introduction of eGovernance: human resources, technology and organization. The most frequent obstacles are the ones coming from individuals, politicians or residents who would like to keep the "status quo", either because of distrust in technological advances or simply because they are ignorant about what information technologies can offer in the field of information-related business. Objective problems are of serious nature, comprising lack of funds and human resources, social pressures, absence of coordination and joint systematic approach with external parties.

13.5.3. KEY PARTIES

Key participants. Transfer to electronic business and eGovernance must include all interested parties: citizens, economic entities, public administration, political parties and all other national and international organizations and institutions that can contribute to progress and quality performance of the public administration and the introduction of new technologies in the administration's work. All of this will require important changes of internal operating procedures in the state and local administration, with potentially very complicated implementation. It is a challenge for the administration to adapt and introduce an innovative method of work, including a sound and stable rapport with citizens, economic entities and other organizations and institutions.

Key participants remain the decision-making factors in public administration, as follows: Council of Ministers of Bosnia and Herzegovina, Parliamentary Assembly of Bosnia and Herzegovina, governments of Republika Srpska, Federation of Bosnia and Herzegovina, District Brčko, cantons and their assemblies, mayors and presidents of municipalities and city and municipal assemblies. Support from key participants is vital for the Strategy, as well as total political consensus on the information society development strategy as potential political changes should not alter the adopted concept and defined lines of development.

Key decision-making factors must be ready for maximum mutual cooperation, both on horizontal and vertical levels of government. The emphasis must be placed on coordination, not subordination, and synergy and the most efficient use of all potential and most certainly insufficient resources. Only such approach will make success possible and achievement of results defined in the Information Society Development Strategy and Policy.

14. VISION AND OBJECTIVES

In the development of BiH, extremely important is the common creation of a recognizable vision of modern administration on the basis of modern trends, but out own historical, multinational and cultural specifics. Long-term foundations of a new culture of work need to be laid in the new public administration, which will strongly support and accept experiences of administrations of the developed world. Within modern ethical value systems, knowledge and use or information and communication technologies represent key basis for development of administration in a country. Key actors in BiH must accept that and the responsibility for creation and implementation of the contemporary vision of modern administration in BiH. Great projects and significant objectives can only be reached through joint efforts and directing positive energy of all participants to a set objective: modern and efficient public administration.

As mentioned already, it is necessary to conduct reform and restructuring of the public administration system aiming to increase efficiency and modernize it and make it the foundation of general development in the society and a powerful contributor to expedited integration of Bosnia and Herzegovina into European associations. Public administration established on such basis, professional and accountable administration would primarily be in the service of citizens and business systems and entirely oriented to their legitimate interests and needs.

In such reformed administration, staff would be employed and promoted on the basis of professional competence and performance. Organization and decision-making system would be simplified to the maximum. Policy and decision drafting and making procedures would be clearly defined and well coordinated. Economic, efficient and effective management of human, technical, financial and other resources would be achieved. Transparency of public administration's work would provide for equal status of all citizens and economic entities in terms of access to public information and resources, potential of more objective assessment of employee and organizational units performance and better understanding of problems the administration encounters. There would be a clear delimitation of roles and responsibilities of appointed persons in political processes and responsibility of staff in bodies of administration but who are not involved in politics. Newly created administration would operate in accordance with European norms and values. Citizens and other parties would be able to obtain most public administration's services through electronic communication.

15. STRATEGIC COURSES

Strategic courses and lines of action for eGovernance development are elaborated per fields of actions and development identified in the Information Society Development Policy of Bosnia and Herzegovina. These fields are: re-engineering the administration, technological and developmental basis, infrastructure, inter-operability of the administration's organizational units, fundamental registers, security, joint administrative functions, specialized functions in individual organizational administrative, eDemocracy, eServices, portals and access points.

The objective was to identify all fundamental problems, key prerequisites and tasks for an organized and systematic development of eGovernance as well as projects implementation of which would provide for quickest establishment of eGovernance concept. Particular emphasis is placed on: fundamental (research and development) projects, projects generating the greatest effect in terms of investment, elementary services of eGovernance planned by the European Union as well as other services and functions execution of which would be useful in the first phase of Strategy implementation. For every field, provided are a short description and overview of problems in the given field, overview of present situation of informatization in Bosnia and Herzegovina, global trends and experiences, desired objectives and courses of action with necessary tasks in order to achieve the desired objectives. Apart from identifying technical and technological problems and functions and services that should be automatized, Strategy promotes principles of the existing competence of certain organizational parts of the administration, but it also strongly notes the need for coordination of activities at local administration level with activities of higher level, with maximum consideration of competence and autonomy of local administration levels. Emphasized is the necessity to connect organizational units on horizontal level (e.g. associations of municipalities and citizens of Bosnia and Herzegovina into the eGovernance Development Forum). It is insisted on central coordination of development and introduction of eGovernance in every organizational unit of the administration (governments, municipalities).

15.1. COURSES OF ACTION

15.1.1. RE-ENGINEERING THE ADMINISTRATION

Public administration reform is aiming to bring in substantial changes to mode of operation of the administration, along with change in attitude and value system to meet the demands of today. Implementing reforms entails the change of structure, organization and rules. Small changes can most often be inappropriate, while entirely new concept of public administration can be too ambitious. Reform strategy of "selective radicalism" should be optimal (conducting numerous key reforms that are sufficiently radical to make a realistic difference in the administration's performance). This term entails a selection of adequate number of key changes that can be implemented and that are radical enough to be visible to any citizen. External support to reforms is very important in overcoming resistance and maintaining continuity in its implementation. Efficiency and quality of management are of key importance for reform prosperity. Pace of implementation of reforms is different in certain segments and that is why continued oversight and measuring of reform's success is necessary. The administration should carry out its activities in an improved manner, with fewer funds and in different manner than in the past. Obsolete institutions and practice will be re-conceptualized and replaced with those that bring together reality and demands of dynamic market economy with the democratic system goals. The administration must constantly adapt itself and redesign itself, keep pace with the environment by applying the most recent knowledge. The key issue of the reform is how to preserve coherency and consistency of reform under circumstances of significant weakening of authority and greater division of responsibility between makers of business policy, those who ensure funds and service providers.

Reforms should be conceptualized in a way to enhance and not to mechanically replace old values, such as: justice, competence, observance of regulations and similar. In order for the administrations' reform to be successful, it must have the continuous and undivided attention from the highest level. If this support is missing, reform is abandoned and can in that case cause great resistance to future developmental initiatives.

Reforms should promote modernization, comprising:

- Close relationship with service users (citizens),
- Care about results, not procedures,
- Continued information of the public on reform results,
- Professional and political consensus.

The administration must cherish the culture of continued improvement, organizational innovations, while individual and team functioning should be considered an essential and permanent task. That culture must be built into the system, where appropriate balance has been reached between centralized courses and freedom in local initiative, where there is a principle of clear responsibility for results and where traditional values of integrity and fairness are coinciding new values – cost-effectiveness and quality of service.

Current situation. The prevailing opinion is that the administration in BiH is too large, slow, costly, unorganized and corrupt to a certain extent. Tasks of the administration are conducted in isolated manner, so that individual administrations are doing their part of the job, mutual connections are poor and there is no interest to promote and provide quality service to the end user. The user often goes from one administration/organizational unit to the other (or from one window to the other) in order to get things done. Every body (service or separate structure) is self-contained, and business problems are viewed separately from one another. Consequence of that are multiple record keeping of the same information and the lack of connection between the existing programs prevents offering of quality services and information. For all the aforementioned reasons, the public administration reform is an imperative with the aim (as stated in the third chapter) to increasing administration's efficiency and modernize it, so that such public administration may become basis for general development of the society and greatly contribute to prompter integration of Bosnia and Herzegovina into European associations. Prerequisites for introduction of public administration reform are:

- Defined development strategy and clearly defined vision.
- Consistency and coherency in the implementation of all activities.
- Ensured two-way communication with all participants in reform process.
- Continued learning on previous experiences.
- Affirmation of teamwork and care about joint goals, problems, obstacles and achievements.
- Caring about results and not procedures only.
- Promotion of leadership, innovations and flexibility in the reform process.
- Dynamic environment and competence of adaptation to new circumstances.
- High-performance remuneration system and support to personal initiative.
- Motivation of all participants against "fatigue" from reform.

Basic courses of action of the said strategy of 'selective radicalism' for public administration reform will be directed at decentralizing and de-concentrating power, separating the policy making from policy implementing function, increased control and identification of staff responsibility with the use of market selection mechanisms and development of human resources potential, improvement of service quality and access to

public services. Information and communication technologies are the key factor in support and success of public administration reform. Public administration reform should provide legislative framework for development of eGovernance by making and passing, among others, laws and conventions in the following fields:

- Electronic communication infrastructure and related services,
- Electronic business, contracts and signature and
- Conventions on cyber crime and appropriate legislation.

Use of managerial approach should ensure: precise definition of work tasks, performance assessment – effects and performance quality in relation to set goals, appropriate organization of work and resource expenditure control, adequate remuneration and sanctioning mechanisms, supervision, monitoring and reporting systems.

15.1.2. TECHNOLOGICAL AND DEVELOPMENTAL BASIS

Information and communication technologies make the basis on which development of a modern administration and society as a while is based. They create new potential of problem solving and service delivery, thus directly influencing organization, business processes and their reengineering as well as operational and strategic planning in the administration. Among other things, new technologies provide:

- Automatization of business processes in the administration, thus facilitating the work and increase efficiency and service quality;
- Offering services through new distribution channels (internet, digital television, mobile phones), eliminating spatial delimitations;
- Improved communication within the administration as well as with external parties;
- Strengthening democracy through new and more suitable means of expressing standpoints and opinions of citizens, etc.

Internet incorporates several different technologies (WWW, e-mail, FTP, voice via Internet etc.). It is the driving force and basis for comprehensive development. Internal networks (LAN) are based on same foundations (TCP/IP protocol) and they can easily be connected with other dislocated local networks of the same corporation (via Internet or communication channel) in the external network (extranet). Open standards provide compatibility between different manufacturers of hardware and software components.

Connecting into local network (of computers – work stations) provides (through use of appropriate programs and network services) cooperation and information exchange between employees, that is simultaneous and joint work on one activity, as well as better use of equipment/resources. Administration employees usually deal with documents and forward them. *XML* (Extensible Markup Language) is standard means providing description of information in documents and likewise their sharing and common use in consistent manner. With the help of XSL (extensible Stylesheet Language), one can describe and specify uniform manner of document view.

Development of programs servicing networked clients or clients connected with local or WAN (wide area network) network, opened a number of technical questions related to optimum servicing of clients' demands, division of processing functions in such environment, control of competitive processes, protection, maintenance etc. Modern programs are designed on the concept of distributed, multilayered (usually 3-layered) client-server architecture, with 'thin' client and transfer (transmission) of processing to centralized locations (applicative servers and database servers). IJava became the most standard language for development of modern programs, ensuring their portability and universal quality with extensive flexibility and power of object-oriented languages. CORBA (Common Object Request Broker Architecture) standard provides inter-connection and

interaction of distributed objects, regardless of computer platforms and program languages they were designed in. Development of distributed, object-oriented programs in network, internet-based environment is also a concept of Microsoft's .NET technology. Storing, access, extraction, control and insurance of data integrity in databases is conducted through database management systems (DBMS), while control and execution of operating logic is done through applicative servers. Modern DBMS (for example, Oracle 9i) work on process clusters and with option of parallel processing. Data warehouse techniques provide the option of extracting interesting data from heterogeneous bases and their unification though conversion into metadata. Finally, expert systems and decision-making support systems for specialized problems can be very useful to relevant parties in the decision-making process.

Additionally, confidence in the security of internet transactions has become of key importance for business transactions via Internet. *Firewalls, cryptography, private and public keys* for security encoding and decoding and Public Key Infrastructure (PKI), *digital signatures and certificates* are the solutions and technologies providing secure transactions over Internet and they are of key importance for implementation of eGovernance.

'*Smart cards'* are extensively used in developed countries. They are meant to be used everywhere, e.g. for identification purposes, payment/buying, financial transactions etc. New generations of *mobile phones* constantly offer users new options and new services, expanding from voice and text to internet and video serviced, making mobile receivers units of convergent technologies.

Current situation with use of modern technologies in public administration in Bosnia and Herzegovina is very diverse. General situation is unsatisfactory. Many municipalities do not employ personnel in charge of IT, the equipment is outdated and most often not networked. Even at higher levels of government: cantonal, entity and level of Bosnia and Herzegovina, one cannot observe organized and systematic efforts in development and informatization of administration at those levels, even less so common and coordinated efforts between different parties at horizontal and vertical level.

On the other hand, we have examples of use of the most modern technologies and concepts in centralized system at the level of Bosnia and Herzegovina (state level) but entity level as well. For example, CIPS system for citizens registration and place of residence and issue of documents implemented through the most modern equipment and technology: web-based program with thin distributed clients in location all over Bosnia and Herzegovina (~500 work stations), centralized applicative and DB server (Oracle 9i), working on strong server stations with multi-clustered nodes, where every node has a multiprocessor computer. Personalization of documents with high level of protection is done through modern laser printers; documents are done per IKAO standards and recommendations, valid for European Union.

CIPS system software was designed by local companies (Ping d.o.o and Optima d.o.o), which illustrated the local potential. Development staff employed in CIPS mastered the technology of system development. CIPS system and technology can present backbone of development of other centralized information systems at the level of Bosnia and Herzegovina. However, apart from CIPS, other information systems have been developed or are implemented, e.g. treasury business and operation on the basis of Oracle financial package, border service information system, customs system, tax administration information system etc., giving respectable results (some more developed countries of the region are behind Bosnia and Herzegovina with some of their applicative solutions). Also, commendable are efforts and results in informatization of certain municipalities in Bosnia and Herzegovina. Telecom operators in Bosnia and Herzegovina

monitor and implement modern communication technologies, especially in the field of mobile telephony.

The following information illustrated global trends in the mentioned technological spheres. By 2004, more than 80% standards in US companies will be based on internet technologies. More than 50% of new programs are done with thin (web) clients (annual process for think client maintenance is four times lower than the price for 'traditional client'). 95% of large business systems in US will use multi-layered architecture by 2005, while more than 70% of largest companies (Fortune 1000) is developing their programs in Java (source: Gartner group). Number of reception units for mass use of convergent technologies has already exceeded the number of personal computers today.

Aim of strategic action in this field is to protect investments and expedite development of eGovernment through appropriate orientation, systematic, organized and planned use of modern information and communication technologies on the basis of open standards.

Courses of action should incorporate *organizational, developmental,* as well as *aspects of standardization and quality*.

In the *organizational* sense, it is necessary to establish at every administration level, as part of organizational units (responsible) for information, sections/groups/individuals tasked with technology, development, standardization, and quality, tasked with:

- Monitoring development of new technologies and solutions and suggest and present proposals for use of more appropriate solutions considering price, i.e. their economic rationale;
- Cooperating with relevant parties for technology, development and standardization at horizontal and vertical levels aiming to exchange experiences, knowledge and practice;
- Proposing adoption of standards and initiating passage of laws necessary for regulation of use of new technologies;
- Monitoring use of standards in information and communication systems implemented in organizational units of administration they work in.

In order to complete this task in quality manner, it will be necessary to hire as associates persons from other institutions and companies (faculties, telecoms, institutes and private companies) who study methodologies and standards at work and deal with their use in their (narrow) fields of work. Cooperation should be particularly enhanced with faculties in Bosnia and Herzegovina that train staff in the field of information and communication technologies.

Within the competence of an organizational unit at certain level (e.g. entity/cantonal government level), the following components can be identified as significant for development and implementation of applicative solutions:

- Centrally planned, locally implemented basic components,
- Centrally planned, centrally implemented basic components,
- Central coordination and development management,
- Adaptation to existing processes,
- IT standards.

First two components are described in more detail in sections 4.1.7 and 4.1.8. One of elementary technological postulates is central coordination of all activities and insurance of basic components. Separate activities must be part of the overall integrated architecture. That is how one achieves the highest savings and ensures the highest quality. Introducing electronic service delivery in eGovernance bodies must be accompanied with adaptation (reengineering) of classical processes.

Many studies and research talk of great expenditure/allocation for licenses (25% of total ICT expenditure is for licenses - MERIT 'Study on open standards and open source software in Netherlands', 2003). The Information Society Development Policy of Bosnia and Herzegovina recognized the realistic and potential significance of open software. Encouraged will be use of solutions based on verified „open source" software products as well as domestic software solutions. Analysis of potential and range of certain open source products and support to introduction, training and maintenance are essentially important for successful use of open software. As schools of electrical engineering/information technology/MIS are natural locations where open software is studied and experimented with, it is necessary to establish cooperation with university institutions with capacity for the said research in order to implement the mentioned project.

However, proprietor software will remain very represented in public administration. Coordinated and common approach to largest manufacturers of proprietor software is of extraordinary importance for the most favorable licensing options, as one can achieve substantial savings like that.

Development. Development of every use in eGovernance should ensure the demanding product quality and compatibility with other/external systems, in the domain of eGovernance but it should also be efficient, ultimately rational and economic. In order to achieve these goals, it is necessary to have a systematic and organized approach, incorporating use of appropriate standards in all phases of the products' life: planning, analysis, development, implementation and maintenance. Considering the fact that a large number of use and activities need to be implemented and that the number of professional staff in administration is disproportionately small in relation to developmental needs, it is realistic to expect that the biggest part of work (development, implementation and maintenance) is conducted through recruitment of professional development companies, institutions and individuals outside the administration (outsourcing). Outsourcing should be based upon following principles:

- Detailed analysis on elements that would become subject of outsourcing. Implementation of activities outside the administration should be allowed in cases when internal capacities cannot implement the planned activities within the set timeframe, scope and quality.
- Primary functions (analysis and planning, identification of requests, management, supervision, protection and data security) cannot be subject to outsourcing.
- Contracts should be put in place to protect from complete dependency on provider (control over source code and data structure in particular, specific circumstances of maintenance and software supplement etc.).

However, internal staff in the administration is irreplaceable in primary development functions (analysis and planning, identification of requests, management, supervision and data security) and in specific uses (especially those with security attributes) as well as in the process of model, prototype and development of entire uses.

Primary activities in this field include definition of methodology for development of programs and systems in administration as well as definition of methodology for project management in administration, particularly in the field of information technologies.

Standardization. Standards protect investments and ensure compatibility between different components of solutions, regardless of manufacturer, which is why solutions must be based on open standards. Heterogeneity of solutions in the existing IT programs generate a problem of inter-operability of certain bodies in the administration. Introduction of standards is based on the following principles:

- Standards are of vital interest for definition of all information and communication elements of eGovernance.
- It is necessary to ensure inter-operability and portability between programs of eGovernance as well as support to existing procedures.
- Standards provide creation of technical manuals for development of eGovernance programs. Results include: openness, scalability, simplified system management, independence from fixed work places and neutrality from operational systems.
- IT standards and architecture should not be static, but must be continuously analyzed and updated in accordance with technology development.

A group should exist as part of the Information Society Agency of Bosnia and Herzegovina to prepare standards for adoption, to implement them and to offer support and education at lower government levels. One of the first activities must be the identification and systematization as well as familiarization with standards necessary for development of the information society of Bosnia and Herzegovina.

International Organization for Standardization (ISO) is responsible for global standardization, while in the field of information technologies competent is the Joint Technical Committee for Information Technology JTC1 - (ISO/IEC). Apart from ISO, numerous professional associations contribute to the standardization in the information technologies field and a number of standards prepared by the Institute of Electrical and Electronics Engineers (IEEE) and the Association for Computing Machinery (ACM) have become ISO standards. Overview of relevant ISO standards in the information and technologies field is provided in Annex 1.

The role of the International Telecommunication Union (ITU) is very important in the field of telecommunications. There are three organizations in Europe which cover standardization in the field of information and communication technologies: CEN (Comité Européen de Normalisation), CENELEC (Comité Européen de Normalisation Electrotéchnique) and ETSI (European Telecommunication Standards Institute). In 1998, CEN founded a new section - Information Society Standardization System (ISSS) with the aim of ensuring comprehensive range of standardized services and products to market actors and thus contribute to the success of the information society in the European Union.

Information expected to be exchanged between information systems are diverse in their nature and content. Also, upon establishment of the system, one can expect expansion of used types of information and data. Standard format for information exchange is *de facto* XML, as it is independent from programs or operational systems. It is the language used to describe information and their standard content and exchange. Framework UN/EDIFACT standard should also be used as a standard for information exchange.

Public Key Infrastructure (PKI) is most often used today for authentication and identification of user which is of key importance in electronic business.

The European Union announced its electronic business policy, which entails mandatory use of a number of technical standards ensuring establishment of the skeleton for the entire security management system in information technologies. Basis for the model, next to SSE-CMM, is made of BS 7799 and ISO/IEC 17799:2000 - Code of Practice for Information Security Management.

Quality assurance. To insure quality, it is necessary to integrate eGovernance and quality system. To ensure service quality means to plan, project and offer such services that meet the needs and demands of users in the most economic and long-term manner. Process needs to be planned, prescribed and documented and then implemented on the

basis of those documents. Based on the aforementioned, measurement system is set up to get parameters of decision-making and management of all processes in servicing organizations. That should naturally lead to perpetual improvement of quality of every process. All of this can be achieved only if the system of integral quality assurance is established, to guarantee that all technical, organizational and human factors are kept under control, ranging from user identification to assessing whether demands have been met. It is clear that a high level of awareness and knowledge of quality needs to be achieved and that is why one of the primary conditions is training and education of staff so that they may carry out their tasks in accordance with demands for quality. The most important driving mechanisms are motivation and change of organizational culture. It is evident that integral assurance of quality is explicitly organizational and not technical problem.

First comprehensive systemic approaches of that kind are presented in ISO 9000 series by prescribing certain activities that should be conducted in a way rendering certain level of confidence in the administration. ISO 9001 standard has the largest scope of use in the field of development and assessment of quality system model. It contains complete range of basic demands for quality system of every organization and gives objective criteria to verify system quality.

15.1.3. eGOVERNANCE INFRASTRUCTURE

The very term of state/national information infrastructure (NII) is often simply identified with the term information/data highways/superways. In the broadest meaning of the term, NII comprises all technologies and means for acquisition, storing, processing, transmission and presentation of information (systems for transmission of speech, television, internet, libraries, databases etc.), and in some interpretations it is described as 'electronic market' or 'convergent technology and culture' (Perritt, 1994). American 'National Information Infrastructure Agenda for Action' was a model for other countries in their making of a similar national information infrastructure development plan, with basic objective and commitment of ensuring and protecting access, availability and diversity of information and information technologies. As this Development Strategy entails building eGovernance on the basis of computer processing of digital data, in this document infrastructure entails telecommunication network for data transfer, different servers for support to administration units, security systems in transmission ways and directory services necessary for eGovernance development and functioning.

Development and building adequate communication and IT infrastructure is the prerequisite for execution of plans and achievement of results in other segment of eGovernance. Benefits from building quality infrastructure can only be seen indirectly, through execution of plans and activities in other priority areas, which should be user oriented and directed at increasing quality and efficiency of services.

eGOVERNANCE INFRASTRUCTURE should have the following general characteristics:

- Potential of development/evolution,
- Building on existing capacity and criterion of economic cost-effectiveness,
- Support potential of user to get access to information of interest, based on interactive and direct (on-line) communication.

Telecommunications network should provide physical connection of organizational units of administration in different locations and establishment of virtual private networks. In the process, capacity, protection and reliability of telecommunication network are of key importance.

Communications and IT infrastructure of eGovernance would be comprised of infrastructure at the following levels:

- Public access points

- Municipal level
- cantonal/regional level
- entity and Brčko District level
- state level.

Public access points would be implemented as information kiosks, set in public locations where citizens would gain access to public administration's electronic services and information.

Municipal level administrative bodies should have access points to telecommunication network for linking with higher levels of government (through which information exchange with other parts of administration would take place) and for connection with other external parties (citizens, business systems, nongovernmental organizations etc.).

Entity, district and cantonal level (certain administrative bodies have regional centers also) communication and IT infrastructure should ensure basis for data processing and exchange with administrative bodies at higher and lower level as well as with external parties. At the level of Bosnia and Herzegovina, infrastructure should ensure basis for functioning of administrative bodies, processing of central records and exchange of information with lower levels of government and external systems. In addition, concentration of records and technological infrastructure at state level greatly optimizes use of resources and ensures better and more efficient monitoring of developmental trends. All levels and organizational units of public administration must be connected with telecommunications network.

Current situation is such that basic segment of the information infrastructure – the fixed telecommunication network, is provided by three telecom operators in Bosnia and Herzegovina, currently majority owned by the state: BIH Telecom, RS Telecom and HT telecom. The mentioned telecom operators have connected most places in Bosnia and Herzegovina with regional and optical highways, which ensure implementation of substantial transmission capacities. In addition, Elektroprivreda (power industry) and Railways are planning and building their own optical transmission network in Bosnia and Herzegovina which will create practically unlimited potential for information transfer. Significant problem represents relatively low penetration in the field of landline telephony (somewhat above 30%) as well as coverage in rural areas, which implied the problem of potential of use of universal communication services and potential services of eGovernance for larger number of BiH citizens.

Although with significantly more expensive services, the infrastructure of mobile telephony (Telecom BIH, Mobis, Eronet operators) is also very important for implementation of eGovernance as it provides simple access to (almost) every citizen in the largest part of territory of Bosnia and Herzegovina, as well as to distant points of the administration fixed network do not reach.

Unlike telecommunications network, local networks (LAN) in administration's organizational units are on generally very low level according to available information: created ad-hoc and without projects (or local networks are inexistent) and without adequate organization for administration, maintenance and network development. Similar situation is present with the existing IT infrastructure of the administration (different servers, data sorting systems etc.). However, there are positive examples in organizational units of the administration which understood the importance and necessity of use of new technologies for improvement of quality of their services (CIPS project and some other projects at the level of Bosnia and Herzegovina, solutions in Tuzla and Sarajevo Centar municipality as well as the project and implementation of the local network of City administration in Banja Luka etc.).

Current situation in the administration is characterized by generally lower level of use of information-communication technologies in information processing with even lower level of information exchange between different programs within same organizational units and that is particularly typical of horizontal and vertical connections between different organizational units of the administration. To illustrate, the highest demands for communication between two centers (Sarajevo - Banjaluka) within the CIPS project are currently met with a 2Mbit connection.

One can conclude from the mentioned facts that current demands and needs related to transfer of information are not proportionate to objective needs. eGovernance development understand generation, manipulation and transfer of large quantity of multimedia documents and content, this ensuring meeting greatly larger needs for transfer capacities, which is to be expected in the near future.

The goal is to build and ensure coherent communication and information infrastructure in public sector across Bosnia and Herzegovina, to secure reliable, safe and cheap access and information exchange, within public sector but also in communication of the administration with other external parties. This infrastructure would be the basis for development and implementation of program use and electronic services in other fields of the administration.

Courses of action should be directed at coordinated development of communication and information infrastructure at all levels (public access points, municipal, cantonal/regional, entity/District and level of Bosnia and Herzegovina).

Responsibility for infrastructure development lies with those who decide on development and investment at different government levels. This responsibility is intertwined at vertical levels: lower level has the responsibilities toward higher level too, as lack of implementation of appropriate infrastructure at lower level jeopardizes functionality of higher level (and vice versa). There is an evident need for synchronized and coordinated action, where higher levels of government should coordinate, direct and assist infrastructure development at lower level. However on the other hand, lower levels can overcome inertness of higher levels with their initiatives and provide an impetus with their activities and set an example to other organizational units (as is the case with mentioned municipalities). Objectives of administration reform – orientation to user and increase in quality and efficiency of services will impose the need and strengthen this kind of cooperation.

The previous lines clearly indicate that it is necessary to establish at every level of government, within organization units tasked with informatization, sections/groups/ individuals that will be in charge of infrastructure and be tasked with:

- maintaining and advancing existing communication and information infrastructure of public administration;
- ensuring functioning of infrastructure and providing and promoting use of modern telecommunication services;
- ensuring appropriate supervision and protection of infrastructure from malicious attacks, random errors or damage;
- connecting at horizontal and vertical levels aiming to exchange experiences, good practice, common planning and activity coordination.

Communication infrastructure project in the public sector of Bosnia and Herzegovina should be implemented through coordinated activities of bodies competent for infrastructure development at all levels.

Apart from the aforementioned general demands, the Project should also consider the following:

- connection of minimum 128 Kbit/s for connection of lower government levels with higher levels;
- as the administration must ensure cheap services to citizens, economy and others, that the price of telecommunication services in Bosnia and Herzegovina is high and the administration is a large consumer of such services, the orientation should be to rent optical transmission ways and build one's own telecommunication network wherever that is economically justifiable. The network should be able to differentiate at entry up to 64 classes of services (QoS & CAS) and ensure quality in transfer to the highest level to every of these classes, according to previously defined policy;
- Development and set up of "MetroRing" (MAN) networks should be supported and larger towns;
- Unification of data transfer protocol (TCP/IP);
- As it is necessary to connect several information systems through one uniform infrastructure, VPN technology should be used via midlevel to state level and applied at the highest level. Users would use one physical link at access points, while VPN would provide creation of virtually private networks (tax collection system, customs system etc.);
- The existing CIPS system infrastructure should be used as basis for systems with central data processing at the level of Bosnia and Herzegovina;
- Considering the commitment stated in the *Information Society Development Policy of Bosnia and Herzegovina* to 'balanced development of the information society, including distant (rural) areas', ensured should be as wide as possible coverage of remote areas with telecommunication network;
- Examine parts of development of administrations' telecommunications infrastructure development of the appropriate state institution where they can and should present themselves as investors or partners to telecom operators.

Privatization of telecom operators can have a tremendous negative effect on the development and building of telecommunications infrastructure of the administration. That is why it is necessary for the Communications Regulatory Agency to create a necessary and clear framework aiming to prevent every, both state or private, form of monopoly after privatization. During privatization (previously well assessed and conceptualized) defined should be conditions which will ensure continued and expedited development of the telecommunications sector, as well as availability and favorably structured price (in terms of the environment and payment potential of the citizens of Bosnia and Herzegovina) of telecommunication services on as wide as possible territory of Bosnia and Herzegovina. For the said reasons, it will be necessary to consider the opinion of public administration experts tasked with infrastructure in the privatization process.

Adequate information infrastructure should be ensured at all administration levels upon which administration programs and services would be developed and implemented. Exchange of experiences and good practice is particularly important, especially at the same administration level. This exchange should take place through the eGovernance Development Forum, to be established and which should gather all participants in the eGovernance development process.

Information infrastructure at the level of Bosnia and Herzegovina should be built around the existing infrastructure implemented through CIPS project, comprised of two network operational centers (NOC - Sarajevo and Banjaluka) and the "Personalization Center". The entire eGovernance infrastructure should have a unique Domain Name System, to be implemented on two servers - primary and secondary, to be located in LANs of the NOCs.

15.1.4. INTER-OPERABILITY OF ADMINISTRATIONS'S ORGANIZATIONAL UNITS

Undisturbed flow of information in the public administration should be ensured for implementation of quality administration's services oriented at meeting needs of citizens and business systems. Technical specifics and solutions should be defined with the aim of ensuring inter-operability and coherence of the information systems in the public sector, which must be viewed as foundations to overall strategy of eGovernance development. In addition, ensured should be a uniform manner of communication between eGovernance programs and external business systems inside BiH and at international level.

Defining technical framework for data exchange and implementation of adopted specifications in programs would ensure efficient information exchange between any programs directly supporting the given specifications and without the need for any specific adaptation of programs. The goal would have been achieved through that – undisturbed flow of information through the entire eGovernance system, which would effectively increase the value of installed programs. Such solution musty also consider data security in exchange, i.e. data should not be received by someone who is not authorized to receive them, not there should be an option of unnoticed change of data during their transport through the system.

Current situation in this key element of integration of eGovernance in Bosnia and Herzegovina is such that there is no conceptualized, elaborated and defined technical framework or standard for data exchange. However, this problem was identified and real needs underlined it. The implementation of central and uniform registers (of citizens, vehicles and documents in the CIPS system for example) opened the issue of exchange of these information with other systems which need this type of information, system within administration (border service, police sector, administration bodies competent for preparation, organization and implementation of elections etc.) as well as with systems outside the administration (insurance institutes, banks, businesses, citizens etc.). At other levels of the administration, there are lonely efforts for inter-operability of certain programs, mainly within individual organizational units and at 'bilateral' level between programs.

Development efforts and trends for solving this problem exist in developed countries and globally. However, until today, no international standard was adopted for general solution to the problem of inter-operability of administration's organizational units. Based on general standards, different organizations and governments have defined several different frameworks and protocols for electronic data exchange.

Aim of activities in this segment is to ensure undisturbed flow of information in public administration, and a uniform and standardized manner of communication between eGovernance and external systems: citizens, businesses, different organizations and administrations/governments of other countries.

This brief overview illustrated that the problem of inter-operability is key to implementation of eGovernance. Courses of action should be oriented at establishing expert group within Information Society Agency and the Inter-operability Forum. Concept and standard of inter-operability between organizational units of public administration (as well as inter-operability with external systems) need to be defined and verified through appropriate projects, including the role and responsibility for continued advancement and implementation of the adopted concept.

15.1.5. FUNDAMENTAL/CENTRAL REGISTERS

In the process of eGovernment building, one of priorities is the harmonization and connection and/or integration of fundamental databases aiming to ensure their integrity and efficient use by all parties who have appropriate solutions. Fundamental registers contain information of particular importance for functioning of Bosnia and Herzegovina as a whole, they are frequently used and by a lot of people but they are not available at local level. However, next to fundamental information, connection of all systems and databases is significant, as highlighted in the segment on interoperability.

Registers for which different administration levels are competent (state, entity and local) can be divided on: civil, security and economic registers. Having in mind different levels of administration (state, entity/district, cantonal and local) formed will be/ or are already existing registers at certain administration levels. The fact that data generated and available in one organization unit of the administration is used an and needed by organization units in other, horizontal or vertical levels, brings several questions, for example: technical manner of acquisition, placement, exchange and use of information, then the issue of competence and ownership over data, responsibility for accuracy, availability and security, funding etc. On one hand, data processing at lower levels clearly delimitated responsibility and competence and allows for initiative at 'lower' level, while on the other hand it hinders the information availability (especially when the problem of inter-operability is not appropriately solved) so that integrality and completion of information depends of initiative, will and potential of lower levels. That is why it is necessary that the following criteria are observed when deciding on formation and manner of processing of these registers: functionality, economic quality and, although something conflicting, legal jurisdiction.

Functionality entails meeting all needs in terms of type of information, promptness, availability and others, with meeting technical criteria defined for the related field.

Economically entails finding optimum balance between technical conditions and options, availability and price of material means and human potential in the given legislative framework.

Legally prescribed competences essentially determine and define manner and level of administration where registers are kept.

Current situation in terms of formation and running fundamental registers at the level of Bosnia and Herzegovina is such that a great step forward has been made with adoption of the Law on Central Register and Information Exchange, The Law on Protection of Personal Information and implementation of the CIPS project (Citizen Information Protection System), which implemented that law to a large extent. The law envisages central register of the following:

- Records of national ID numbers (*JMB*)
- Records of passports
- Records of ID cards
- Records of residence
- Records of visas and residence permit
- Records of driving permits
- Records of vehicle registration
- Records of criminal records.

CIPS project provided for set up of sub-system that lead centralized record of national ID numbers and residence of citizens, ID cards and passports, driving permits and vehicle registration. Unique criminal record of police reports has also been established. Programs in certain sub-systems use the necessary information from uniform fundamental registers.

In other countries, the largest number of fundamental registers is kept at central level. In Slovenia, those are registers of: citizens, cadastre, businesses/ companies, tax registry, registry of electronic services and procedures, available to citizens etc. The Croatian Strategy for Information and Communication Technology Development includes a commitment to 'building uniform system of state registers and records with complete use of the principle of protection of personal information, except for the content considered as state or business secret. That is what adoption of the law on state registers and the law on protection of personal information is necessary'. In Germany, records of a number of fundamental registers are kept at federal level, such as the central property register, central spatial data register, central crime records register, register of motor vehicles and traffic etc.

The aim is to conduct harmonization and connection/integration of fundamental databases and build and maintained updated the system of central fundamental registers, in accordance with the law, and to ensure their appropriate law-abiding use on the part of parties in public and private sector and citizens.

Keeping central records is regulated by the law. Organizational changes must be followed by change of legislative regulation where necessary. Keeping and administering central registers should be in competence of the Information Society Agency (AIS) once it is inaugurated. Further courses of action should be oriented at definition of manner, procedure and technical solutions in use of information from fundamental registers on the part of external systems. That will provide connection of the system of fundamental registers with other systems of the administration. This should be done jointly and in coordination with the project to define inter-operability concept and framework.

15.1.6. SECURITY

eGovernance must have a framework for secure work with information. This entails that all measures of protection in information systems of eGovernance must be undertaken to minimize loss of information or their unauthorized alteration/use, which would cause incalculable consequences in some cases. That is why solutions should be developed and defined, measures prepared and mechanisms established to provide information and communication security. This is of key importance as that creates conditions for all parties using eGovernance services to gain confidence that transactions they conduct with the administration are reliable, protected and with the requited degree of confidentiality. Measures of information protection in public administration can also have, directly or indirectly, significant influence on increase of electronic security in the entire society.

However, exaggerated or inadequate focus on security may on the other hand results in solutions that are too rigid, complicated and expensive and can represent an obstacle to development and use of new technologies. Use and use of new information techniques and produces and communication networks is a dynamic process, which requires permanent and systematic focus on: potential of administration's access to critical resources, quality of services and protective mechanisms. Therefore, it is necessary to permanently assess risks on the hand and the security system on the other, seeking balanced solution. Security mechanisms must also take into consideration the Law on Protection of Personal Information and prevent unauthorized use of personal information subject to legal protection.

Current situation. There was no common organized and systematic approach to protection of information in public sector in Bosnia and Herzegovina. Instead, the protection was set within certain programs in related organizational units of the administration. Also, insignificant number of people is involved in this issue and there are no groups in the administration which are tasked with continued involvement in security.

Significance and comprehensive quality of data recorded in the CIPS project and the requirement for their protection initiated activities on sub-project titled EGIPT (E-Government Information Protection Techniques). This sub-project is aimed at defining the standard of protection for sensitive information used by commercial and state organizations. The state of Bosnia and Herzegovina set high standards in terms of confidentiality and integrity of personal information of citizens and information about them, so that demands placed by EGIPT are oriented at commercial and state organizations that store, process or transmit information on BIH citizens. This program insists upon annual verification of compatibility with EGIPT demands for all state and commercial organization that connect to eGovernance databases via information exchange servers.

EGIPT's functional demands are based on 10 elementary security request the eGovernance sub-systems must meet, including several detailed sub-demands, dependant upon the degree of sensitivity and volume of information being process and stored. EGIPT does not dictate solutions; however, server and network owners are obliged to demonstrate they meet demands.

Modern techniques and trends

Verification of declared identity. Modern computer systems must usually verify identity of every user before the user is allowed use of computer resources.

Currently, developments on the market offer the following technical solution for authentication systems:

- Password
- List of passwords
- Tokens
- Smart Card with digital certificate (PKI)
- Biometrics

In 99% of cases, authorization systems are implemented using Radius (Remote Authentication Dial In User Service) protocol, defined in RFC 2138 and expanded with RFC 3579. User's database can be stored in ordinary, so called flat filed or bases that are SQL or LDAP (Lightweight Directory Access Protocol) compatible.

At the moment, most governments demand from manufacturers that ICT solutions implemented in processing of confidential or sensitive information must have certificate from independent test laboratory confirming that the testing object meets the protection profile defined for given program. Globally recognized certification method is described in a document titled Common Criteria 2.

Aim of activities in this segment is to establish secure framework for eGovernance functioning to minimize potential of loss of information or their unauthorized alteration/changing during electronic processing, i.e. that the informatization of administration's functions and electronic transfer of information will not lessen the level of confidence in public administration, while security measures must not visibly reduce efficiency of informatized procedures.

Courses of action in this segment should be oriented, in terms of organization, to formation/identification of sections/groups/individuals tasked with security within organizational units (competent for) informatization. Security strategy for all administration's units should be designed in the Information Society Agency of Bosnia and Herzegovina, with the involvement of all other available human resources in the administration, the academic and private sector. In parallel, it is necessary to work on development and implementation of a unique system of authentication and authorization for programs in the administration, as follows:

- For transaction-oriented authentication, system based on “password list” is recommended.
- For network infrastructure management, recommended is the “token-based” security system.
- For issues related to digital signature and secrecy of e-mail communication between parties, recommended is creation of PKI, based on PGP (Pretty Good Privacy), where every user is tasked with creating a property set of keys and the State Agency is tasked with certification of public keys. In other words, after the user deposes his/her public key on public server, he/she has the option to certify that key though a defined process.

It is necessary to launch a research project for analysis of all aspects of introduction of PKI infrastructure, as PKI infrastructure was identified in many countries as a prerequisite for implementation of internal informatized administrative procedures and for delivery of electronic services to citizens and business systems.

15.1.7. JOINT FUNCTIONS OF ADMINISTRATION

Many Administration’s functions are the same in different organizational units, many processes run with the same logic and essence. Examples of such functions and processes in the administration are: finances, human resources record keeping, procurement procedures, statistical systems, document and archive management, case management system etc. Personnel information can be integrated satisfy all parties. Receipt of cases/requests, processing, archiving of the cases closed and communication to parties is essentially the same process in all administrative procedures. E-mail communication between administration employees is essentially identical and one can say, a technical matter. Some of these functions will be briefly described in the text below.

In principle, administration deals with documents. Unlike electronical ones, paper documents are impractical when it comes to transfer, modification, archiving, searching and locating. All aforementioned elements have a significant effect on processing speed. Introduction of Electronic Documents Management System (EDMS) significantly increases the administration’s work speed. EDMS executes receipt, distribution and storing of documents in digital formats of computer systems and the internet. Every document management system demands method of accepting entry, place for storing, indexation system and manner of presentation of content to users.

Job processing automatization supports cooperation between all who work in production-related jobs and exchange of large quantities of documents in accordance with special rules and methods. Job processing system facilitates order of work tasks including the necessary material and human resources necessary for implementation. Job processing may be interrupted, paused or continued. History of job processing and the current situation are recorded and archived. Standardization in this domain lies in competence of Work Flow Management Coalition (WFMC) and current efforts aim to standardize interface workflow product according to: systems for business process modeling, programs, monitoring systems and other workflow systems.

Applying job processing automatization, management and archiving electronic documents can significantly reduce specifics existing in certain segments of eGovernance. Use of these programs directly contributes to establishment of the concept “paperless office”.

Electronic mail is a powerful service for efficient communication between administration employees and between employees and external parties. Electronic mail provides simple distribution of notices, tasks, warnings, materials, comments etc.

Public procurement procedures for information and communication products are prescribed in the Law on Public Procurement, while their informatization would contribute to greater transparency, efficiency and quality of procurement, with reduction in price. That would facilitate work on preparation of offers, freeing significant resources for other activities. Also, the public administration's role as advanced user in public procurement processes would contribute to larger promotion of information and communication technologies in the society.

Apart from the said joint functions, there are several others, e.g. financial and accounting tasks, human resources, decision-making system etc. Statistical functions are very important as they collate statistical data at higher government levels. Management of social communities and complex tasks, such as eGovernance management, depends on the quality of statistical data.

Current situation is rather characterized by individual solutions in some parts (sometimes within one organizational unit) of the administration and general absence of cooperation and coordination in organizational units but also at horizontal and vertical levels. There are positive examples at municipal level, e.g. informatization of registry offices business, done on the basis of foreign donations. However, further development and program maintenance remains a problem (like in the case above) once the donations are cut off. At the level of Bosnia and Herzegovina, a number of joint functions are dealt with and implemented in central manner, largely through initiatives and project management on the part of certain international organizations. Absence of coordination between these projects and other projects at the level of Bosnia and Herzegovina and those at lower levels represent serious problem.

Solutions in other countries are very diverse, depending of their state and political organization, pace of informatization in state administration of those countries, In Norway, selection, development and procurement of information and communication products and systems are very decentralized in public administration, even at central administration level. Join intergovernmental measures and activities incorporate knowledge management, availability and sue of data (inter-operability) and public key infrastructure for electronic signature.

In Slovenia, joint functions of public administration are top priority as their formation solved the same problem in several instances. Joint administration functions are divided in three groups:

- Joint centralized activities, incorporating functions carried out at one instance/body for all other organizational units;
- Connection functions, demanding cooperating with other bodies – implementation-oriented (Statistical Institute, for example);
- Joint decentralized activities (finances, human resources etc).

There are several implementation options:

- One body implements joint functions for all organizational units,
- Joint function is implemented independently in organization units, but in the same manner.
- Similarly in Germany, identified are joint functions planned at federal government level and implemented locally as well as functions centrally planned and centrally implemented.

Aim of activities in this segment of eGovernance development is to significantly increase the level of information and communication technologies in the BiH public administration, through implementation of applicative projects, use of open standards and consideration of specific quality of inter-operability.

When defining courses of action one should bear in mind the specific characteristic of legal regulations in certain parts of Bosnia and Herzegovina, in comparative units of the administration, which implied that IT solutions in one organization part of the administration are often not 100% applicable in another similar organizational part. However, the essence of related administrative procedures remains the same and one can potentially talk of varieties of one and the same solution. This provides solution of a problem for the entire administration in Bosnia and Herzegovina, with development of smaller number of IT solutions (one or two for example). This statement does not entail pushing for one central solution to be imposed on all parties, but the potential for all organizational units to get to certain applicative solutions in the most rational manner. To get on that path, one requires cooperation and coordination of work between organizational units dealing with the same problem, leaving independency to lower administration levels, unless otherwise regulated by the law.

The first step entails analysis of joint function of administration and definition of principles and courses of action for IT support to these functions (finances, human resources, general administration affairs, decision support system, payment system, user care systems, content management and others). Result of the analysis should include proposal for reengineering of process and organization of joint functions of the administration there where it is deemed necessary, with suggestions for unification of existing solution on the principle of cooperation and coordination of certain parties.

Introduction of electronic data processing, informatization of job processing in the administration, legal regulation of use of digital signatures for signing electronic document, protection of documents is particularly important.

Project for analysis of potential and effects of informatization of public procurement and definition of the concept should be planned as well as a pilot-project for concept verification. The solution must not directly or indirectly hinder local delivery of products and services, i.e. they must consider local and regional interests. Use of IT solutions at lower levels of administration should be based on a range of harmonized electronically available frameworks. These projects should be coordinated with other ones (building infrastructure, security, legal regulations and technical solutions for support to introduction of digital signatures etc.).

It is particularly important to initiate a project of analysis of available statistical data necessary for eGovernance development with a proposal of measures.

Central planning of informatization of joint functions in one's own competence should be insured in organizational units/administration levels. Informatization of procedures in organizational units can be either central or decentralized by sections of administration. It is very important to ensure cooperation and coordination of work in finding solutions to joint problems and functions at different levels and administration's organizational units.

15.1.8. Specialized Functions in Individual Organizational Units of Administration

Fundamental organization, i.e. Execution of administrative functions takes place within highest administration bodies, i.e. ministries.

All administrative areas of competence will be IT supported, i.e. administration's functions will be automatized by forming information systems for every domain with concrete program solutions.

Applicative solutions will provide internal (state bodies) and external (citizens, economy) administrative services users with quality and quick electronic services. All applicative solutions will consider organizational line (highest→lowest level, ministry→local administration body) of every function aiming to get to uniform services.

Changes in structure of organization of the highest level of government (merger of ministries or creation of new ones) comprising areas of competence, should have little effect on certain functions i.e. solutions must be flexible and modular.

End user should not be necessarily familiar with concrete administration level or internal transaction between administration bodies in order to electronic services. Changes of certain information will be conducted in one location through entry into appropriate register and will be forwarded to all other necessary locations.

Many functions that are in ministries or local administration bodies' competences are conducted through paper work, while use of information and communication technologies remains at low level. Certain sectors have already independently initiated or commenced with informatization of their priority fields. Diversity of methods, approaches and technologies used in implementation and monitoring of such individual solutions results in lack of order in the system with very questionable end results.

Aim is to implement electronizes 'back office' though informatization of all administration's functions (including specialized ones) to provide, through electronic services: simple, quick, quality and complete services to end users.

In order for the specialized public administration's services to be electronically supported, it is necessary that all administration levels partake on preparation of concrete activities – from local to state government level. Private and non-governmental sector should also be included in implementation of those activities.

Administration staff should get a clear image about benefits of the introduction of the new system and they should undergo IT training (where necessary) as well as be motivated to actively participate in creation and use of those IT supported systems.

Procedures to obtain services from certain administration's organizational units should be simplified to the maximum, as to be user friendly. They must be focused on (citizens) end users, and not the administration.

Transparency of administration's work must be incorporated in all automatized systems. Rules and requests necessary to obtain one service must be clearly stated in order to minimize potential individual employee action. All programs through which e-services are conducted should provide end user with insight into current status of their request. Good practice should be introduced as one of vital factors in decision-making on concrete activities – via exchange of experiences between local and regional communities (towns, municipalities, regions, countries). *When defining priorities, one should consider the economic situation – price of implementation, social factor – benefit for citizens etc.*

Efficient electronic record management needs to be introduced. Current situation is such that most archives are paper ones, regardless whether databases exist or not. Electronic record or documents management systems need to be introduced as support to all public administration's functions. They can be maintained and accessed in manner which preserved authenticity and integrity of information stored, with harmonization of electronic and paper systems.

15.1.9. eDEMOCRACY

Digital democracy can be defined as democracy which reflects the IT age, where citizens are ensure with far larger and better access to government organizations and information and offered potential of rapid information exchange between large number of people, through ICT and internet in particular. That also promotes non-governmental associations, citizens' association and others.

In order for one democracy to represent 'the will of the people', elected representatives must communicate well with people who elected them. As political communication is one the elementary tasks of democracy, it follows that new communication technologies can have a very important influence on democratic processes.

Digital democracy entails use of ICT in order to enhance the power of democracy and especially as a tool which provides citizens with more direct participation in policy making. It should incorporate potential of new communication environment, which has the power of increasing quality of public participation in governance. E-Democracy development will have significant effect by facilitating society revitalization and enabling citizens to articulate their ideas and opinions and involving them in decision making process. The following basic models of e-democracy can be mentioned:

- *electronic administration*, which entails electronic management of state business;
- *information management,* which relates to creation efficient communication between citizens and decision makers;
- *populist model or "electronic city hall" model*, which enables citizens to electronically publish their views on certain issues. Electronic City Hall represents a tool of interactive and direct interaction with public servants and electronic dialogue between citizens as well as interactive voting tool. On-line community focuses discussions and citizens can discuss different ideas related to a given question. On-line communities entail interactive communication networks within people which share joint interests and exchange ideas and opinions, independently from geographic region;
- *civil society model* related to transformation of political culture through communication technology, which should affect quality of public debated and change inter-personal relations;
- *accountable democracy model,* where the term "agreement" entails complete consideration of different results and alternatives to certain questions. Accountable democracy model ensures establishment of on-line forum for discussions between politicians and citizens;
- *representative and direct democracy combination model* entails that citizens set values and decide what issues demand solutions through representations and what are those that will be solved directly by them.

Although insufficiently tested, the e-democracy field should, with the use of ICT, strengthen democratic and political life of the country.

Aim is to continuously improve quality of mutual communication between citizens and public administration by providing citizens with opportunity to request and receive services and information wherever it suits them best, wherever they live. Informatization of public administration will facilitate to citizens and business people finding what they need through Internet, with services and information organized by parties.

Digital revolution will have far-reaching positive consequences on all public institutions and the way they function will be entirely changed. New concept of self-service will be created and citizens provided with so far unseen degree of control.

Public administration can act in two elementary fields when it comes to e-democracy development:

- e-participation
- e-voting

Modernization of voting method by improving access to ballots and expanding consultation are areas which underline ways in which democratic mechanisms can be advanced.

Implementing ICT in voting entails offering electronic services package like on-line voting and on-line registration (e-voting in elections for parliament or local elections, referenda, private ballots under legal scrutiny, on-line voter registration and on-line absentee voter

registration). These options entail previous existence of reliable mechanisms for electronic identification of citizens (through 'smart' cards for example).

Use of ICT for opening of new channels for participation in between elections entails creation of entirely new relations between state administration, citizens and their representatives (e-participation of citizens in: government political processes, policy-making processes, passage of laws and vetting of elected representatives, policy-making process within political parties and other civil society organizations).

Internet services should provide access to public information by all legal entities and physical persons. That will ensure access greater openness and responsibility of public administration staff, limit basis upon which information can be kept and increase participation of the public in public bodies' decision making.

Critical points. Overall success of e-democracy will largely depend on building confidence of citizens and institutions in technology, primarily from the aspect of exercising security and confidentiality. The issue of protection of right to privacy, intellectual property and other will grow more and more important, particularly in countries where regulations will remain inadequate or not in place at all. Acquiring confidence of voters in robustness and security the technology should ensure, is also one of critical factors in e-democracy's success.

15.1.10. eSERVICES

Principal actors in the processes of public and future electronic administration, among which exists interaction are elements of administration (in foreign languages *Vlada*/Government), *građani* (Citizen) *i privredni subjekti* (Bussines). Electronic administration development is in the interest of any of the above mentioned parties. In short, development of this sector would improve efficient of administration's work, increase quality of services to users, work and process transparency and enhances participation of citizens in democratic processes.

In the context of modern technologies administration (*vlada*/Government) exercises its role via services to citizens and economy. These services are implemented at different administrative levels, depending of legal arrangements in force, i.e. on level of centralization and decentralization.

Prerequisites placed before electronic administration for it to function efficiently, i.e. offer complete electronic services to citizens, business and other parties, are following:

- broadband Internet access, adequate communication and IT infrastructure of the administration;
- electronic databases;
- programs for data processing, access and exchange;
- access points for service delivery (PC via Internet, different types of terminals available in public locations, mobile devices etc.);
- security system reflected in access to services via appropriate security mechanisms (smart cards in form of ID card, GSM cards, PIN and PUK codes and other).

Meeting aforementioned conditions represents list of activities that should be executed in order to enable establishment and functioning of eServices. In order to implement the eServices concept, activities should run in two directions: increase IT culture of citizens and building IT infrastructure. These two activities are linked with one another. Essentially, conditions should be created to increase number of Internet users by increasing number of access points and number of global network clients. In parallel, work should be done to ensure infrastructure and security mechanisms enabling secure

access to eServices and that lead to establishment of inter-operability, in domestic scene as well as at international level.

Current situation in this field is unsatisfactory as there was no systematic approach in setting up of eServices. Results are symbolic and can be reduced to availability of certain forms on internet, at different government levels. But the purpose of eServices is not to provide information to citizens only or to have citizen access to form he/she would fill and use traditionally. The purpose of it is for the user to obtain service, i.e. be served based on the request and access to administration "from home" or from work place.

Many experiences globally show mechanisms and scope of eServices implementation. Germany formed a list of 383 services at federal level in its Bund On-line 2005 strategy. Based on this list, a list of projects was made. They were implemented or are being implemented now. Estonia's experience is also positive. In 1997, Estonia commenced with systematic development of information sector. In 2002, it issues electronic ID card, which enable citizens to conduct certain services in administration and economic sector via PKI infrastructure. Citizens of Estonia now, with the help of ID card, obtain health insurance or pay public transportation. In Italy, the electronic ID project is underway, with participation from local administration, Ministry of interior and Ministry of Finances. As the system in Italy is rather decentralized, keeping data on citizens is done at local administration level and it is the local administration that establishes services citizens can obtain via identity document. Ministry of Finances assigns tax numbers which are at the same time national ID numbers, while the Ministry of Interior at state level coordinates world and ensure there is no misuse.

Aim of activities in this segment of public administration is to provide citizens, businesses and other parties with opportunity to exercise their obligations or requests to administration as efficiently, with minimum costs and the number of physical contacts with the administration bodies via several different electronically-based channels for service delivery (web, mobile phone, digital television etc.).

When defining courses of action in this field, it is necessary to commence with legal regulations that currently do not support electronic business and electronic service delivery. Then it is necessary to define services conducted by all administration levels, conduct precise division of services between different government levels (state level/entity level/ …/local levels). As aforementioned, activities should be initiated to build infrastructure for extensive use of services, working on other hand to prepare administration in offering electronic services.

IN parallel with new legal arrangements, administration should be subject to reengineering of its work/procedures and information flows. As indicated by research conducted in Germany, a total of two third of services conducted in administration are related to the following groups: collection, editing and relaying information, processing uses submitted to administration's bodies and promotion process. One should therefore focus on these types of processes.

The following table shows potential of interactive electronic services between different parties and eGovernance, mentioned earlier in the text.

	Economy	Administration	Citizens
Economy		G2B	
Administration	B2G	G2G	C2G
Citizens		G2C	

In the context of joint function of administration and other functions related to internal functioning of all levels of government, it is necessary to initiate projects that informatize

processes between different segments of administration (G2G-services – administration with administration).

G2G-services are implemented to connect automatized processes between:

- administration units at different levels
- administration units at the same level
- administration units at the level of Bosnia and Herzegovina and administration bodies of foreign countries, in accordance with legally prescribed competences.

Projects that need to be implemented can be grouped by joint functions of the administration and specific functions, which need to be implemented so that certain part of the administration could function, as described in items 4.1.7 and 4.1.8. During implementation, orientation should be on use of information from fundamental registers, in order to achieve integrity and promptness in the entire eGovernance system.

G2B-services include services for implementation of public tenders and procurement via internet, services for administration electronic business with banks, services for acquiring instructions, information and legal procedures business are interested in etc.

B2G services will provide that business persons can conduct all their business with the state by electronic means. These services include the following: company registration, paying liabilities to the state, registering employees, paying workers, control mechanisms for all the mentioned functions.

C2G and G2C services should provide citizens with opportunity to conduct all their business via internet: paying taxes, taking personal documents, registering birth or death cases, scheduling wedding ceremonies and availability of different service information and participation in democratic processes.

C2G and G2C group of services should also comprise identification management (IM), i.e. monitoring citizen identification electronically by introducing the so-called electronic identity card, i.e. “intelligent” electronic cards and principles of security and global inter-operability.

15.1.11. PORTALS AND ACCESS POINTS

Aiming to ensure unique entry point in eGovernance and to provide simple and user friendly access to information and eGovernance services via internet, adaptive internet portal with appropriate sub-[portals will be in place for citizens, business, administration employees, foreigners – individuals and organizations. Access via portal will be possible from work places, personal computers at home or public information kiosks. Apart from the portal, interested parties will have access to desired information and services via telephone, GSM WAP, SMS, via digital television or direct communication with government administration.

Current situation is characterized by existence of certain number of web sites at different government levels. At the level of Bosnia and Herzegovina, a number of ministries and administrative organizations published web-pages where one can see certain information on those organizations. CIPS Directorate published a web-site providing information on the status of personal document. Entity governments and majority of cantons have official government sites with relevant information on the government and activities of all ministries. Certain local administration units launched their web-sites as well.

All developed countries have portals whereby one can simply acquire all relevant information on the related countries (tourist information, economic, education, political, cultural etc.) and which contribute to creation of a positive image of those countries in terms of investments and cooperation. In addition, citizens and business themselves can

use the portals to get to information of interest to them: legal regulations, social benefits, terms of education and scholarships etc.

Aim of activities is to build a unique portal on behalf of all public administrations' web-sites, providing information of interest on the principle of one destination (one stop shop), as well as secure, quick and reliable transactions with citizens and business systems. Portal organization should be based on the user's needs and not the organizational structure of the administration, with unique content and design, regardless what segment of public administration is accessed.

Courses of action will related to defining portal structure, building public access points and defining terms and conditions under which parties will access eGovernment resources. Access conditions should be based on the user's group affiliation.

User groups are: eGovernment employees, citizens and businesses. Access to information can be acquired through the web or SMS, e-mail, digital television (planned).

The portal would be comprised of XML e-form, identification system and communication connection to public administration infrastructure. Prior to using eGovernment portal, user should:

- register – registering with competent body for creation of user order, temporary code and input the user will user or PKI authentication, depending on developed infrastructure;
- entry – registering of services the user wants to access;
- request processing – following digital entry.

15.2. CRITICAL FACTORS

There are several factors upon which eGovernment and BiH information society development greatly depends. Above all, success will depend on genuine commitment of relevant decision-making parties, i.e. parties deciding at certain administration levels and their readiness to support these processes to the maximum. Another critical factor is made up of human resources, currently insufficient when it comes to informatization in the administration. Ensuring the necessary number and quality of human resources which would carry and implement eGOVERNMENT development will require particular measures and strategy on the part of office holders in the administrative. Although BiH's economy is weak, administration expensive and budgetary income insufficient to meet all needs, investment into information society and eGovernment development must be a priority at all government levels. In addition, the necessary organizational measures must be conducted to set up appropriate bodies/organizational parts at all government levels, to implement the set policy and strategy of informatization. Creating awareness and disseminating information on the potential and advantages of informatization is very important, particularly among administration employees and service users (businesses and citizens).

15.2.1. DECISION MAKERS

It is known that Bosnia and Herzegovina is a complex state structure, with complicated organizational structure and articulated political, national and regional tensions. It is not easy to implement complex processes in such environment, in particular the development and introduction of eGovernment, where parties and resources of all administration's units need to be involved. Even more significant subjective factor, apart from objectively complicated organization of Bosnia and Herzegovina, is made up of relevant decision-makers at all levels of administration in Bosnia and Herzegovina. There is no sufficient understanding yet for the role, significance and necessity of informatization and development of the information society, as driving and development guarantee –impetus for other segment of the economy. Strong and unquestionable commitment was not

expressed in support of these processes. In order to overcome these obstacles, stronger promotion of eGovernance introduction is necessary through: presentations organization for decision makers and political factors, roundtables, expert and public discussions, appropriately covered by the media, all throughout development and introduction of eGovernance.

15.2.2. LABOR MARKET AND HUMAN RESOURCES

Thanks to SFRY heritage, BiH kept a relatively high quality of IT education. At BiH universities today, over 100 students per year should acquire a diploma in IT field. However, many of them leave Bosnia and Herzegovina and fin jobs abroad without too much trouble. As experts, they are valued everywhere in the world. We have seen recently that many young people, talented ones in particular, leave to study in foreign countries, in Austria primarily, where they have good conditions and special benefits when studying. Although this process has substantial quality to affect the self-containment of the education system and transferring experienced from developed countries into Bosnia and Herzegovina, it is of concern that most of these young people do not have the intention to return to Bosnia and Herzegovina because of its current situation, to apply and transfer the knowledge they acquired.

Education in IT field is undoubtedly one of key factors to stimulate development. Present working and financing conditions as well as certain legal solutions limit quality development of IT departments at universities, starting with stimulating scientific and research work at university or inaugurating modern labs or similar things.

As knowledge and human resources potential are of key importance for eGovernance development, with orientation and commitment for information society development in Bosnia and Herzegovina, appealing projects of high technological value, good developmental environment and better material incentive, we can do a lot to reduce the ever present 'brain drain' trend.

The administration does not comprise sufficient ICT staff for transformation into electronically supported administration. There are several reasons why: decision-makers do not understand the need for informatization, and appropriate staff necessary for it, such activities and this field of work is underestimated and there are objective difficulties in finding funds for informatization. On the other hand, ICT professionals fin jobs elsewhere with relative ease. Quality staff is well paid in private companies, foreign dealerships and organizations or "distance" work for foreign companies. That is why ensuring staff and quality staff in particular, could pose a serious problem for the implementation of eGovernance unless this problem is approached in serious and urgent manner.

The following activities should take place in order to resolve this problem in the most favorable way from the perspective of eGovernance:

- Ensure concentration of quality IT staff in the administration though: establishment of agencies/sectors/units for informatization or similar bodies at certain administration levels, incentive-driven contributions for deficit staff and jobs of particular importance, housing loans, stimulating permanent education of IT staff though professional development programs, option to connect to library systems, visits to conferences, seminars, fairs etc. ICT staff is absent from the administration, especially the staff trained and qualified to specify requested for certain sub-systems, assess the best solution, supervise and monitor implementation and ensure the most rational way of system maintenance by looking at the entire system, its connections with external systems and considering technological trends and standards and experiences of others.

- Cooperate with the academic sector through support for establishment of institutes and laboratories and closing contracts on eGovernance projects with universities/faculties of electrical engineering, IT and economy in Sarajevo, Banja Luka, Mostar and Tuzla as well as other higher education institutions in Bosnia and Herzegovina of the said profile. One could involve up to 100 experts from those universities to work with appropriate parts of the administration, especially in research and development matters.
- Involve the private sector through outsourcing of all activities not of key importance, based on precisely conceptualized and defined requests and in accordance with positions states in item 4.1.2. Competition in the private sector (with minimizing opportunity for manipulation through well defined and electronically supported procurement procedures) will provide achievement of quality and economically rational solutions. This will also support and strongly affect development of the private sector in the field of information and communication technologies.

15.2.3. FUNDING SOURCES

Experiences from several countries show that informatization projects have multiple positive effects and show that funds invested return quickly. Therefore, eGovernance development should be understood as a development initiative which returns as profit and not as cost. Projects can be financed in several ways:

- Budget funds
- donations
- commercial arrangements
- loans.

All administrative bodies, from municipal level upwards should plan in their budget the funds for IT projects implementation, based on joint implementation plan (part of this Strategy) and their specific needs.

EU government and the US governments have donated rather significant amounts for implementation of certain projects. All of those projects are mostly implemented without mutual coordination even next to an unsuccessful attempt of the OHR to enhance links between different ICT projects though the Total Information Management System (TIMS) coordination. Funds are spent irrationally as same software and hardware resources are used, but separate network infrastructure. The international organizations should in future close contracts with the Council of Ministers so that management and coordination of these projects would run through the Information Society Agency.

Implementation of generally important projects, which are also very demanding financially, is often hindered due to budgetary limitations. Large users of G2B services, such as postal officers, banks, telecom operators, insurance companies and others, have a natural interest in funding implementation of these projects.

Considering the level of investment into new technologies and trends globally (as described earlier) it is necessary to plan more funds in the budget for informatization and eGovernance development. Budget allocations should be at the level of ~2% annually, which translates to around 80 million KM annually at the level of Bosnia and Herzegovina (including all administration levels). With foreign donations, loans and commercial deals, this amounts would be around 100 million KM annually for Bosnia and Herzegovina. With these funds, rational investments and coordinated efforts and cooperation from all administration parties, one could achieve very powerful and remarkable results, to return the investment through savings (e.g. use of 'information highway' would to a large extent replace expensive business trips and costs, free a lot of energy and time because of efficient communication and service provision etc). This amount must be absolutely

accepted and acceptable as the minimum amount as it ultimately represents return of portion of funds to the information and communication sector and technologies acquired from that same field via turnover tax in this sector and the telecom operator license.

15.2.4. ORGANIZATIONAL ASPECTS

In general, there are no adequate eGovernance development and introduction support units or they are not conducting their tasks appropriately in terms of informatizing the administration. For every country, including Bosnia and Herzegovina, it is necessary to have appropriate state-level bodies to implement comprehensive informatization policy and strategy. This was recognized in the regional electronic South East Europe (eSEE) initiative and as a joint activity and commitment of the countries in the region was to establish (by 30 October 2003) bodies responsible to carry out informatization-related activities at state level. At the level of Bosnia and Herzegovina there is the CIPS Directorate, tasked with implementing the CIPS project but in practice, it also carries out part of activities that overcome initial tasks of the CIPS project. In certain ministries at different level and in municipal administration there are sectors/department/section/groups or individuals tasked with informatization. In general, those organizational forms and their defined competences and obligations do not meet the realistic and actual needs of the administration, particularly in the context of implementation of the development policy and strategy. That is why the issue of adequacy of the existing supporting mechanisms needs to be reassessed at all administration levels and the necessary modification or build-up conducted. Particular emphasis needs to be placed on inter-governmental coordination and cooperation within every administration's organizational unit as well as cooperation with other similar organizational units at horizontal and vertical level.

At the level of Bosnia and Herzegovina, it is necessary to establish a uniform agency that would look after the eGovernance development (also), which demands high level of information, technological and methodological integration. This agency would act as integrator and it would not *a priori* centralize technology information or development of IT projects. Every ministry or administrative body at the level of Bosnia and Herzegovina could have its own IT service, in accordance with laws on their competence and organization.

Primary tasks of that Agency would be, among others:

- Design and monitoring of implementation of the eGovernance Development Strategy in BiH;
- Development/leadership, management of operational work and maintenance of informational systems and fundamental registers implemented and run centrally at the level of Bosnia and Herzegovina;
- Electronic support to bodies at the level of Bosnia and Herzegovina, administrative business, legislative procedures, monitor the work of the Council of Ministers, the Parliamentary Assembly etc.;
- Maintain PKI infrastructure and issue digital certificates (Trust Centar);
- Verify/review opinions related to projects conducted at the level of Bosnia and Herzegovina in the eGovernance field, implemented by other organizations or companies : giving technical grades on selection of equipment for all more significant IT projects in ministries and BiH bodies etc.;
- Execute technical coordination of work of all ICT sectors in other ministries at the level of Bosnia and Herzegovina;
- Cooperate and coordinate with entity/Brcko District bodies in charge of technical development and implementation of the eGovernance system in projects of

informatization of joint functions (document management, electronic mail services and other electronic services, security and protection systems etc.);

- Administer and maintain communication and IT infrastructure of centralized functions at the level of Bosnia and Herzegovina;
- Coordinate development of the overall communication and information infrastructure of the administration in Bosnia and Herzegovina;
- Take a lead on development of standards, recommendations, instructions etc. for all government levels in Bosnia and Herzegovina with participation of experts from entities/Brcko district, e.g. inter-operability standards, information system development methodologies, standards and instructions for security and protection, framework for public procurement procedures for eGovernment, recommendations and assessments of certain technologies technical solutions etc.;
- Participate in defining draft legislation necessary for introduction and functioning of eGovernance;
- Education of staff of their eGovernance parts based on knowledge and experienced acquired, organization of information and experience exchange at the level of Bosnia and Herzegovina through seminars, conferences, publications, thematic sessions and work of the eGovernance Development Forum of Bosnia and Herzegovina.

The Agency should be distributed organization through inauguration of development centers in Sarajevo, Banja Luka, Mostar and Tuzla, thus facilitating human resources needs of the Agency and implementing complex and voluminous tasks.

In addition, there should be organizational bodies at the level of Bosnia and Herzegovina to look after the larger aspect of development of the BiH information society, for example the aspect of education, market-based development and support to development and innovation, promotion of information and communication technologies, cooperation with non-governmental organizations, international cooperation etc. These functions should be implemented within one or more ministries at the level of Bosnia and Herzegovina, logically - in cooperation with the Ministry of Traffic and Communication at the BiH Council of Ministers. There should also be an inert-governmental committee and the Information Society Council, which would gather experts from different walks of life and would act as advisory body to the Council of Ministers.

Similar bodies, with lesser volume of tasks, adapted to needs and potential, should be inaugurated at lower levels of the administration entity/district/c canton. At the municipal level, joint function should be implemented though the IT department or a similar body. Cooperation at horizontal and direct vertical level of the said organizational units of the administration is of key importance, with regard to solving common problems. In every organization part, identified should be concrete focal points in charge of cooperation activities. It is only in that way, with combined forces and cooperation, that one can get to quality solutions and ensure the highest degree of rational investment. All municipalities in Bosnia and Herzegovina should be connected though the *eMunicipalities Development Forum* as medium for joint agreement and planning, exchange of ideas, experiences and knowledge.

15.2.5. COMPETENCES, RESPONSIBILITIES AND COOPERATION

One of critical factors is the issue of competency of certain administrative instances in terms of informatization. Inertness, incompetence, lack of knowledge and resources at lower administrative levels is often the argument to impose solution from higher levels, even when the issue of competence is legally placed at lower level of administration. Imposing a solution can become a practice, so that the informatization process may be

blocked due to narrow minds at the 'smart' higher levels. In the other hand, lower government levels are sometimes not ready to cooperate with higher levels, even when they themselves do not have the resources to solve certain problems and when they would benefit from such cooperation. Considering the fact that the issue of technical implementation (central or distributed) often has a number of other consequences and issues (competence of bodies and ownership over data, responsibility for accuracy, information is updated and secure, the issue of development funding, profit disbursement etc.), it is necessary to observe legal regulations concerning the aforementioned matters. It is also very important that all administration elements are ready to cooperate mutually, exchange information and 'good practice' and that they are ready to solve similar or identical problems by joining resources, knowledge and all other potentials.

15.2.6. MEDIA SUPPORT

Electronic and other media in our environment can plan an important role in raising the general level of digital education and culture and endure the necessary degree of digital awareness, thus improving the introduction of eGovernance project and interest in its use on the part of citizens. It is also very important to have positive opinion of the media and adequate media promotion to contribute to creation of as large as possible political consensus for accomplishment of the Strategy's goals and to obtain understanding and support of the citizens, business and other organizations.

ICT Infrastructure

Society today entered the third decade of transformation of the postindustrial period into the information and communications one. The process of informatisation of today's society not only continues, but also accelerates. The transformation is influenced by the information and communication technologies alike. The accelerated development is the result of their joint action, i.e. the effect of the ICT.

What level have the world and Europe reached and on the basis of what kind of technology the Internet, digital transfer systems were developed, what processes and data can be used, where are we and why are we there, what to do and how? Those are the questions that this Strategy provides at least partial answers to.

Why and for which reason is the strategy important and what does is contain? The strategy contains a brief overview of the current state in the world, as well as the world trends, the state in our country, as well as the desired state in BIH, and the possible ways of achieving it, with recommendations and necessary actions.

The world trends show that:

- Digitalization and package commutation processes are continued, etc.;
- Data transfer extremely exceeds the voice transfer;
- The need for broadband access systems is increasing;
- The presence of mobility and multimedia is expanding;

which presents the upgrade of the current state.

Our current state is demonstrated by the following data:

- Penetration rate of the fixed and mobile telephony and the Internet network (we are still a great deal below the European average);
- Fragmentation of the telecommunication market;
- Technological variety and divergence;
- Poor development of services, etc.

What kind of a state we need and what we need to aspire to:

- An increased level of development and harmonization of networks;
- An increased level of system integration;
- More developed basic, additional and other services, etc.

which is dealt with in the Strategy in detail.

If we want Bosnia and Herzegovina to be a part of the modern, developed world, we need to understand that it is high time we:

- Decreased the divide in development and application of the ICT in contrast to other, developed countries of Europe and the world;
- Developed our won ICT Industry;
- We built business and other systems on the basis of the ICT application, etc.

which we cannot achieve without creating adequate ICT Infrastructure that includes:

- Establishing a single ICT-Highway on the level of the entire state, by introducing new technologies, and also by rationalization of investments;
- Intensive introduction of new technologies and building broadband access networks;
- Safe transfer and protection of data in virtual business and other networks;

That is why this Strategy contains several proposals, such as approaching the building the ICT Infrastructure in an organized and planned manner, with the implementation of designated and other projects, and proposed solutions in accordance with the Action Plan.

These and other goals can and must be achieved through the recommended and other stimulating measures to create a favorable environment, especially by educating all the participants in the process.

16. INTRODUCTION

16.1. ICT INFRASTRUCTURE IN THE CONTEXT OF THE IS DEVELOPMENT IN BIH

The ICT infrastructure represents the basis for the application of the IC technologies; therefore, it is crucial to analyze all the aspects of this key segment of the society computerization. As there are several parameters included, each of them needs to be considered in the aim of understanding the factors that influence development and application of the ICT infrastructure in the world, and in our country.

16.1.1. ICT INFRASTRUCTURE – BASIC *IS* COMPONENT

Information and communication technologies enable the transfer and use of all kinds of information and represent the most dominating generic technology today. As such, they are the basis of the economy and the society of the century. These technologies generate the change in all spheres of society. They apply to all parts of economy and in all areas of science, and present the ground for successful business, and all structures of society and government. That is why the economic and social development of a county needs to be based on these technologies. Easy access to information and knowledge will enable making quality decisions in business, state management, health care and private life. Distance will no longer present an obstacle to communicate, learn, do business or provide health care.

Information and communication technologies have to contribute to the economic growth, increase of employment rates and entering new markets. In the following five years, we need to join the developed countries in research and development of information and communication technologies, and in their application in the creation of new products so that they could become a significant source of income. By developing electronic management based on the use of ICT, we need to improve the quality of service that the government provides to the citizens, small and medium enterprises and companies, and the efficiency of the state, canton government, local authorities and public services.

By building low—cost, quick and safe information and communication infrastructure, we need to ensure that the needs of citizens, economy, state authorities and society in general are met. Meeting these goals should lead BIH towards the information society, or the knowledge society, and thus closer to the developed countries group, and especially to the EU. The proposed Strategy plans are aimed at the realization of the set tasks through the provided recommendations with plans of activities to reach them. So, at the global level, this report relates to the technical aspects, technological possibilities, application level, legal and regulatory ambiance, social aspects and their consequences in the total level of development of the country.

16.1.2. DEVELOPMENT ROLE OF THE ICT INFRASTRUCTURE

Either the informatisation, or the introduction of the Internet cannot be done, especially in a successful manner, without the necessary infrastructure, and above all the ICT infrastructure.

There are numerous examples of comparative analyses of the development of the ICT infrastructure of a country and its application as compared to the total development level of the country. The development of the ICT is more or less directly proportional to the GDP level of any country. The same goes for our country; due to the major lagging of the country's development in comparison to other countries of the SEE region, and especially to the EU countries, the ICT infrastructure, measured in the penetration parameters, also lags behind. On the other hand, the computerization development is directly linked to the development of the ICT infrastructure, which makes the overall connection of all the stated factors apparent. The development level, that would be sufficient to us, cannot be determined.

If you monitor the mutual relation of the economic and development parameters and the characteristics of the ICT infrastructure development, you can attempt to provide the answer to the question of finding the solution in pushing things faster forward, towards better development and overcoming the divide in relation to developed countries. If the development of the ICT infrastructure is a precondition for its application and greater use, a logical conclusion then is that there should be more investments in this area, until we approach the developed countries in accordance with the criteria that guarantee further development of the country computerization and the entire society. It is clear that the country does not possess the means to invest in this area on its own, which is why the main investors in this area need to be stimulated by the country authorities.

Many world studies, among them also the UNDP study, point out the relation between the development of the society, especially small and medium enterprises, by the application of the ICT. So, the development of the society computerization has a clear influence on the total development of a country. This should lead towards the increase of the GDP and in turn, in accordance with the studies, more interest of foreign investors in greater investments. That is a new stimulating factor to increase direct foreign investments in BIH. That is how we come to the effect of increasing possibilities of further investments in the ICT infrastructure, and the process thus widens in a spiral movement, by initiating dynamic economic growth of the entire society. Here the investors in this area are awarded a completely new social role, namely that of generators of society computerization development, and at the same time generators of the total country development. ICT can serve as a leverage to solve some of critical aspects of the society, and as support to all other potentials for the country development. ICT infrastructure is a prerequisite of the society and knowledge economy in this century, that will contribute to the increase of the quality of life, and more efficient and competitive business at the state and global level.

16.2. ICT INFRASTRUCTURE

The key segments of the telecommunication infrastructure are the areas of telecommunications, the Internet and the radio and TV diffusion of multimedia services. The information and communication infrastructure is made up of platforms and networks necessary to create and provide services to users. The ICT infrastructure is treated from two aspects:

- Social (social and economic) aspect, and
- Technical (technical and technological) aspect.

The social and economic aspect treats the environment, education, stimulating measures, reflection of the liberalization and privatization process on the ICT infrastructure, etc.

The technical and technological aspect treats the telecommunication infrastructure, namely the backbone – the common information highway, the core or the core network and the access network that is distributed and the most important part of the process of accessing the Internet and of the distribution of multimedia services. The need for terminal equipment and devices is also a part of the ICT infrastructure, and relates to the terminals, computer equipment and programs.

Basically, the state information infrastructure (SII) is not only comprised of physical equipment for connecting and transfer of various types of information. It also includes the following important components: a wide range of various devices that are used, the information, notwithstanding its form, application and software, that enable the users to access, process, organize and view the increasing mass of information that the SII provides the users access to. Then come the network standards and transfer codes that facilitate the interconnection and interoperation of networks, ensure the privacy of people and both security of the transferred information and security and reliability of networks. Finally, there are also the

people, especially in the private sector, who create the information, develop the applications and services, construct the machines and teach others to use their potentials.

So, all these elements need to be developed and included in the SII in order to develop into the information society. The development of the SII becomes the means to reach a wide range of goals in the economy and society. This is how the possibilities for opening new jobs, reduction of costs in health care, improvement of the quality of services in distant areas, providing more quality and low-cost public and government services, preparation of the youth for the life in the new technological environment and creation of more opened democracy at all levels of government are created.

16.2.1. DEFINITION OF CONCEPTS AND SEGMENTS

The information and communication infrastructure is made up of networks, systems and services users can access. The information infrastructure includes systems, programming equipment and applications with which the content of the network is shaped, processed, filed, accessed, searched and distributed. The content means the information with direct value to the user. Information activities are performed by organizations with various commercial roles, such as the owner, provider and whole seller of the content, the owner of service infrastructure, provider of communication services and access to the Internet, and access to information.

The owner of the content possesses the original form of the information. The content can be offered to users for free or with a charge, and the business charge model may include advertising or exchange of information. The ownership over the content means possessing the copyright and commercial rights. Most of companies present at the Internet will have the role of the owner of the content. The content provider transforms the original information into a form suitable for further reshaping, publishing, processing, filing, access and search. It shapes the web sites, creates web interface for accessing databases, and provides access to the existing data or services. The owner of the content, that at the same time enables it, serves as the provider. The company that possesses the technological and organizational abilities can be the content provider, and the company that purchases the content from a larger number of owners or enablers, and offers a great variety of content to the market, serves as the content trader. The owner of the service infrastructure controls the servers, computer systems with memory and processing capacities necessary for providing contents. There are special operators dedicated to performing safe transactions and support to the electronic trading and other types of eBusiness. The minimum requirements include the organization of service providing, if possible from one's own server that possesses databases, settlement and service providing control, etc. The information approach ensures easy access to contents, by offering special content that describes other contents (sub-contents), and can be realized as a portal with a collection of links to the content or as an electronic trading centre with links to virtual stores. The roles of the content provider and the information approach are combined into a search engine that often serves as the communication service provider. The provider of the communication service provides the communication between the users and the network, between the users and the corporate networks. An Internet service provider facilitates the access to the Internet and its services. Each ISP is at the same time the provider of access to the Internet. The ISP often performs the tasks of the communication service provider, content provider, information access and owner of the service infrastructure. Some ISPs concentrate only on business users with larger demands for reliability, speed and capacities of information and communication infrastructure.

16.2.2. STANDARDIZATION

Standardization, or harmonization of state standards with the practices in Europe and the world has the major role in the development of the information and communication

infrastructure. Except its role in the support of development of the compatible systems with optimum technical characteristics, the standardization enables fair and equitable competition in equal technical environment for all the participants. This enables the protection of users, on one hand, and directing the private and state-owned companies towards investments in development in accordance with future needs of the society, on the other.

Standardization in the area of the ICT is going through a swift and dynamic growth. As for the telecommunications, this process gained the momentum at the start of de-regulation, in early 1980. Old standardization organizations adjusted their activities to the new, much larger arena. Their previous practice, namely that of careful selection of "best technical solutions", had to be adjusted to the need of adopting standards in relation to the activities of the seller and service providers whose activities are suited for the markets of the future.

The standards issue is a crucial one and represents a critical factor for the advancement of an open data network composed of components and services provided and used from various sources, and are owned by various subjects. Establishing standards for open data network (ODN) is a great challenge and task. It has to solve various and competitive approaches; unilateral standards for dominant providers, as opposed to developing an open and multilateral environment, as well as tensions among simple, short-term solutions and the long-term, general, more expensive and flexible ones.

Global communication network, a growing maze of alternative networks, does not have a particularly good structure. The role of standardization is, therefore, important to finding global solutions. As a result of the rapidly changing technologies and the market competitiveness, time has become a major market factor for the success of service providers and product sellers.

In order to achieve quick access to the market, not only is the swift development of standards required, but also meeting of true needs of users, and implementing them in a profitable manner. This means using open standards in the entire area of information and communication technologies. It has been generally accepted that if a standard is to be adopted, then, under fair and reasonable terms, the license for the intellectual property rights connected to the standard, needs to be given as well. In relation to standardization, great efforts have been put in defining an open API (Application Programming Interface) for application access to the functions of the access and core network. This opens up the possibilities for a wider environment to participate in a faster and more innovative services and application providing, from the point of view of the users, and faster and more efficient growth of operator service portfolios. OSA/Parlay is a new type of the open API for NGN, that enables operators and service providers to offer the same services in the existing, as well as new networks, without adjusting the applications to network specific protocols.

16.2.3. STATISTICS

In telecommunications, under statistical data we mean a certain group of processed data that describe the development of the infrastructure, its use, cost of telecommunication services, available technologies etc. The most significant indicators are still related to the number of connections or users of fixed or mobile telecommunication networks or the Internet, in relation to the total number of population. There are also the indicators that describe the quality of infrastructure such as, for example, the number of ISDN per 100 lines, broadband lines per 100 lines of fixed network, etc. Besides the infrastructure indicators, other elements can be monitored, that indirectly provide the picture of the state of telecom and cable operators liberalization, etc. The statistics is important because the comparison with other developed and developing countries can give the appraisal of the development of certain environments in the telecommunication sector. The statistics in

monitoring strategy realization is a tool that will play a corrective role in the course of individual stages of the implementation of short- and long-term measures.

16.3. TRENDS IN THE AREA

16.3.1. THE ROAD TO THE INFORMATION SOCIETY

The ICT has started the discussion on future social movements, due to its possibilities of automatic gathering, filing, transfer and processing of data and information. In those discussions it has been concluded that the ICT has long been affecting all areas of economy and all social activities, and that even now we can talk about the existence of the information society. Considering the expected growth of information technologies and considering the fact that in discussions information is often understood as knowledge, the information society is often called the knowledge society. The ICT enable an effective exchange of information, information handling and automatism of certain knowledge-based activities, but can in no way substitute for people in the formation and use of knowledge. We should, also, stipulate that, in all activities directed towards the stimulation of the use of the ICT, we need to start from the fact that in addition to the creation of the infrastructure and procurement of equipment, it is of equal importance to stimulate the increase of the level of knowledge needed for their efficient use.

In the process of development of any country and the efforts to approach new conditions of work and life, the order of strategic actions would start from placing the Internet as the top priority (access, use and availability), then users should become the focus of attention (eConnectivity – i.e. users can use the key services via their computers, interactive digital TV or 2.5G and 3G (mobile phone generations)), up to focussing wide accessibility through broadband networks, while paying attention to the security of networks and information.

Every country that aims at the creation of sufficient conditions for living and working in the information society environment needs to set the above goals as its priority. Considering the current overall state of Bosnia and Herzegovina, both in the economy and society, and considering the goals that are set in all areas of life in the sense of reaching European standards and the efforts to join the EU, it is completely clear that the EU has set for itself, are the goals of Bosnia and Herzegovina. Clearly, the dynamics are different, because our country has to start from a much lower position in all areas, including this one. On the other hand, this enables us to skip some unsuccessful stages and apply the latest technologies and solutions.

From the above said, we can conclude that the world is moving towards the information society, or the knowledge society. A precondition for that is building the information and communication structure based on the principles of GII – Global Information Infrastructure, and that every country, depending on its own state and program, should define the SII – the State Information Infrastructure. Here, the principles of universality and openness of systems, that are able to accept, process, file and deliver any type of information in accordance with the required dynamics and of required quality are defined.

16.3.2. ICT INFRASTRUCTURE DEVELOPMENT TRENDS

The demands of the market and supply of the equipment producers are two key moderators of the trends that are characteristics of the ICT infrastructure in the world. As it is composed of various systems of communication: fixed telecommunications network, mobile network, satellite systems, radio systems, TV broadcasting, cable networks, the Internet – it seems at the first glance that it is difficult to notice common parameters and their mutual influences that are significant to the general development of society computerization. It is clear, however, that all these systems are somehow interconnected. Common services and interoperability are the elements of those points of contact. Since this affects the global application of all technical systems, with a common demand for

their total compatibility, it seems that only one answer results from the demand for interoperability and compatibility, namely the general globalization process.

Basic directions of these global process are demonstrated in the fixed network, by the development of commutation digital systems, common protocols, application of various media of transfer, which brings unique demands both for the access network, commutation and transfer systems, and the need for backbone and core networks with great transfer capabilities. Dynamics of the communication systems development can best be seen in mobile networks, with tremendous growth rate in relation to the number of users, application of services, increase of transfer capacities, intelligence, control, etc. the basic characteristic of the trend in mobile communications is that they are becoming universal.

The development of the telecommunication infrastructure in the world and Europe is based on enabling conditions for the development of the GII – Global Information Infrastructure, through the Next Generation Networks (NGN). Under the NGN we mean various definitions by various participants in communication activities. However, a generally accepted aim of the introduction of the NGN, as seen by the users, operators, and service providers is that this is infrastructure that enables modern new services that the operators of mobile and fixed telephony networks should offer, at the same time providing the existing services. From the point of view of only operator/service provider point of view, the NGN can be defined as the IP manageable networks that meet specific requirements of the operator and provide the possibility to upgrade blocks for service providers with additional value.

Mobility is now considered to be the main characteristic of the NGN. The introduction of managing mobility and "motility" are the requirements set to technological solutions for providing these advanced services to the user who is on the move (nomadic user). The IMT 2000 Standards are the systems based on the "All IP" global roaming and solutions where the radio-access technologies are independent and enable "debt and charge". By the WLAN (Wireless LAN) access, multimedia services are offered, thus speeding up the convergence of fixed, mobile and Internet services. In principle, the broadband access for the user will be the basic task of the infrastructure operator. Great multinational companies have built powerful highways with optic fibers, using various technologies such as SDH/SONET, DWDM, SDH 64, IP/MPLS, and are able to offer all the required permeability ranges. The introduction of the third generation of mobile communication is already in progress in many developed countries. TV broadcasting has the trend of shifting from analogous toward digital TV with clear visions of realization of interactive TV, be it terrestrial, satellite or cable. The Internet appeared as a phenomenon of the last decade of the previous century and is constantly confirming its dominant role in the development and application of the ICT. As the application of the Internet is connected t5o all other systems, it represents the key factor of the convergence process in communication at all levels of authority. It is important to recognize certain general principles in the development of the telecommunication or ICT infrastructure. The issues that need to be considered before investing in the infrastructure are:

- Interoperability: mutual compatibility in operations, that can be defined as the ability of two networks to be connected and perform the transfer of traffic from one end to the other, with mutual use of information that can be exchanged. In order to ensure that the existing property and resources of telecommunication networks can be extended to the maximum, it is very important to consider the demands of interoperability in developing the proposed system for the creation of the Internet.
- Scalability: Gradual upgrade. By this we mean that the system keeps functioning well even while changing the size of capacity of content, in trying to

satisfy the needs of user. Typically, the grading is defined in relation to the size or volume. In the case of limited resources, which is often so, the gradation can be used as a tool for the establishment of the ICT infrastructure and the increase of the access to the Internet in the upgrade stages.

- Management: New communication systems, that already include the management functions, require a lesser number of persons to manage, but the staff needs to be experienced and trained. Managing the network and services includes a set of functions for the maintenance and administration (OA&M). Competitive abilities of each participant shall be measured by their ability to react fast and the degree of availability of the equipment and the system. While considering the available technological solutions for providing telecommunication services and Internet access, one should carefully consider the need for investing in people, management systems and the automation of the processes, as a priority in achieving competitiveness.

The technical aspect includes all elements that influence the three basic requirements that the ICT infrastructure must meet. Those requirements are: sufficient capacities and the speed of transfer of transactions, constant availability for use and applicability. The first requirement is met by the broadband parameter. The second requirement can be met by proper dimensioning of the system capacities in the access, transfer, commutations, while paying attention to the trends and the market. The third requirement is based on the compatibility of technologies and services. In this case, the infrastructure and applied technology are only the basis for the creation of services and applications of all kinds and purposes. The ultimate goal of the establishment of infrastructure lies in its application by using and development of applications.

16.3.3. THE CONCEPT OF OPEN DATA NETWORK

In order for the SII to meet all the demands set before it, it needs to be equipped with open and development adaptable interfaces. This means that it is able to transfer any type of information, accept various producers and various users, providers of different network services, in an accessible and continued way. This can be realized through the concept of open data network (ODN), that enables a successful common work of the networks that are mutually connected. An open data network needs to include the following characteristics:

- Open to users: This means not favoring a closed group of users or banning access, but allowing universal connection, a in the telephone system.
- Open to service providers: This provides for an open and accessible environment for competing commercial and/or intellectual interests. So, it does not prevent competitive approach for information providers.
- Open to network service providers: This enables every network services provider to meet the needed requirements and become a part of the group of connected networks.
- Open to changes: This allows for the introduction of new services and applications at ny time. It is, therefore, not limited to only one application. It also allows for the introduction of new transfer, commutation and management technologies, that shall become available in future.

The ability to create and accept the new is the main characteristic in all dimensions, that is necessary for the commercialization and universal quality of the SII. Both the telephone and the Internet network develop independently from concentration on users. In the case of the Internet, the greatest changes happen in the protocol combinations that need to be accepted by millions of computers. Even though the Internet is a typical example of an open network, this concept has not been totally accepted. The example for that are the

cable TV networks that are available only to a limited group of users. Open networks, however, should facilitate the formation of closed groups of users, if that is their choice. The creation of an open data network sets many technical goals and requirements, such as: minimum range of physical infrastructure, minimum set of services available, defined coordination with the SII to ensure the providing of basic services and mark what is not compatible with the open architecture, to support standard setting, to enable the security, control and management development.

Minimum set of application services at a higher level, that is built upon the services of the carrier, transport and middleware includes e-mail, fax, distance logging, data base search, filing digital objects and financial transactions. In accordance with the nature of the SII, these services should develop to become universal. After the minimum set come the more demanding services, that include the audio and video operators, namely the distribution and interactive ones. As one of the imperatives of the further development of the SII comes the issue of the architecture of security, that shall be based on the protection of privacy, security and ensured protection of the right to intellectual property.

16.3.4. HORIZONTAL ORIENTATION NETWORK STRUCTURE

These are complex structure networks divided into the application layer, network management layer and connection layer. The architecture of the telecommunication networks with horizontal structure enables the operators to develop their systems with the greatest degree of flexibility, which represents a key advantage. It is increasingly difficult today to predict the development of telecommunication industry, which is why the transit from the classical systems towards the new generation is a complex one. This is the reason for the urgent need for moving towards the new architecture of the horizontal orientation networks.

In the last decade, the speed of the technological development of telecommunication grew by a tremendous rate. Now, at the beginning of a new millenium, the network operators face a large number of various challenges. Probably the biggest challenge lies in the need for efficient improvement of own networks, in the light of satisfying the needs of a rapid increase of traffic of data and the need for an increasing width of permeability rate to enable the transfer of al classes of traffic and simultaneous and transparent process of multimedia services: speech, music and movable images. The capacity of elements of carrier networks (routers and commutations that implement the necessary protocols) has become the critical aspect of complete integration of all services.

16.3.5. DEVELOPMENT AND APPLICATION OF SERVICES

In the case of SII, a harmonized network needs to ensure a set of core services applicable in the standard form so that the interoperability is insured. That actually means that the harmonized SII network needs to ensure a technically independent carrier service and a minimum set of application level services. The technical conditions and the convergence process have created the conditions for the development of services in the broadest of senses. Their trend is in the enormous increase of transfers of data, images and multimedia content, as opposed to earlier exclusively speech transfer services. The Internet and the interactive TV are the most significant representatives of the application of the ICT infrastructure that have permeated all areas of social activities. Today, in case of services, the key characteristic is the interaction and multimedia.

We can recognize the services resulting from functional needs, other that the standard services offered by the Internet, or the telecommunication, mobile or fixed network. eGovernment is especially developed today, through various services of the state administration and other activities of the state management carried out through electronic means. Electronic business is a concept that includes e-Commerce, e-Banking, e-Payment, smart card, etc, without with world business would be unimaginable.

A lot has been said about the introduction of distance learning, distance working and e-Medicine in a separate chapter of the ICT Forum. These, of course, are not all the applications of services through the ICT infrastructure. It is difficult to list them all, but we shall point out several others, with general importance to the society. The emergency alarm system, in the events of disasters such as floods, fires, earthquakes, etc. mobile communication is of immense importance. News and information generally, including all the political, sports, business and other types of information are available today, from world sources. Side effects of the goal are fun and games, but also abuses such as gambling or pornography, to which no part of the planet is immune. Except the security, privacy, morality and other issues, it is undeniable that the use of the ICT has a vast significance to any society, as well as ours. The penetration rate of all forms of telecommunication infrastructure resources is significant for a wider use of the electronic services, i.e. that of fixed, mobile, cable, broadband connections and other, as well as the penetration rate in relation to users of individual services: the Internet, cable TV etc.

Broadband: Mixing the regulatory strategies and the lack of political vision have significantly slowed down the development of the competitive broadband market in Europe, unlike Asia and America, where extremely fast services have appeared. The indicators show the state in relation to the broadband penetration per 100 lines installed: Korea 21%, Hong Kong 15%, America and Canada 11%, while in Europe it was 8,5% in 2002 (ITU-T). As a consequence, some European countries have different indicators of prices of xDSL lines. So, the UK has prices that are four times as expensive as those in Japan and other G7 members, and the penetration there was only 2,3% per 100 lines. The most recent indicators for 2003 show some progress in the sense of awakening in Europe, but a 12 months delay behind Asia and the US is a large one. Still, many serious issues need to be dealt with as soon as possible, since this can influence the long-term consequences of business competition. The cause also lies in the chronic lack of competition of Europe in the broadband space, with only 80% of xDSl connections under control and the true presence exists only in 5% of the market. There is also the issue of speed, with standard value of 8-12Mb/s for incoming traffic in Japan and Korea, and the standard European package for data transfer is still 128 kb/s. Only the countries with a developed cable networks, such as Belgium, Holland and Portugal, reach 1,5-3 Mb/s thanks to the use of a cable modem. In the rest of the region, the best users can hope for in near future is 512 kb/s. Overcoming the problem lies in the hands of companies with major market power and their investments in the development of such infrastructure. Still, the times are changing and the year 2004 should be the year of broadband. The IDATE prognosis is that more than a third of European households will have a type of broadband by 2007. The new, technologically neutral approach will allow the operators to build or buy suitable solutions on the basis of the service providers' requests.

Interactivity: With the development of multimedia services, the demand for interactive communication arises. This demand for infrastructure includes the services that enable two-way and simultaneous communication. This communication take place between two users, a user and the service provider, the call center, etc. An example of interactive work can be found in TV (interactive TV), with the appearance of which other services were advanced, especially those Internet based one. Interactivity is the basis for all new systemic solutions in service providing, education and distance working.

Mobility: This requirement is imposed on the mobile and satellite networks, and in a way on fixed networks. There are two basic types of mobility: full or terminal, and limited or personal. These demands result from the need to cover larger areas on ground. Except the communication in move, special services have developed with the development of mobile services, based on the principles that these technologies offer. We should especially point out the services on the basis of positioning, which we mentioned earlier (LBS – Location Based Service).

Multimedia: Already with the existing networks there appears the need to multimedia services. New and future services shall exclusively be based on the combination of various services from which the demand for multimedia results. It requires more data for the transfer of information and better permeability. The best example is the functioning of the Internet, as an example of a multimedia service. These services shall appear both in fixed, and mobile, and all other types of networks.

Intelligence: With the appearance of powerful computer units in the form of servers, the request for additional value services appeared in the network, this demand shall have a great influence over the networks with layered structure. The solution to the current added value services is available through the so-called IN platform that unites the services of the distribution and centralized type. The best example is the UPT that could not have been developed, and especially implemented, without the application of the IN Networks philosophy.

16.4. EXISTING INITIATIVES RELATED TO THE AREA

Cheap, fast and safe infrastructure and services in accordance with the eEurope Initiative is the goal to be aspired to. The principles of an open network, use and procedures of charging in accordance with principles of objectivity, transparency and no discrimination. Europe has been promoting such approach since 1987, as Open Network Provisioning (ONP), and improved it in 1998 to achieve harmonization at the competitive market.

Realizing that the advancement of telecommunication is a key condition for the development of economy activities and a competitive market, the European Union Commission passed the Guidelines on the competition in the telecommunication services market, in 1990. By the Guidelines the member countries accepted the obligation to ban special or exclusive rights to providing telecommunication services, except for voice telephony. The main reason behind the postponed liberalization of voice telephony was the financing of the entire development of the phone service network and enabling stabile business for telecommunication organizations. After that came the ban of exclusive and special rights (satellite communications, cable TV, mobile and personal communication), and incentives to harmonized development of networks and introduction of new technologies. The wish is to create an open and internationally competitive telecommunication market with incentives to investments and offering jobs.

The eEurope Initiative creates such a political framework that is concentrated on priority activities that direct towards the removal of these faults. The final goal is for Europe, with the help of a special promoting education strategy, to have the most competitive society in the world, based on knowledge, by 2010. By reaching this goal, the quality of life of citizens shall be improved, as well as the working conditions and total competitiveness of products and services. The Internet access, i.e. on-line access to knowledge, education, government, health care, entertainment, culture, financial services and other is a today's right of every individual, and the governments are obliged to enable it. The new knowledge society should be covered by programs directed at joining the society. So, this would be a European model, with high social protection. It especially relates to the cultural and language diversity, meaning that the access to the services and content should be achieved in one's own mother tongue. While the Internet is pushing the world towards a global village, Europe is trying to help every culture and every language keep their role, at the local level.

The answers to these questions can be found in the eEurope 2005 Action Plan. This document represents a set of measures that relate to potential users of services (e-Government, e-Health, e-Learning, a dynamic e-Business), and measures with potential service providers. eEurope 2005 Action Plan is, therefore, based on two groups of activities, that support and reaffirm one another. On one hand, the plan stimulates the services, applications and content, both for the public and the private sector. On the other hand it relates to broadband infrastructure and total security measures.

17. THE CURRENT STATE IN BOSNIA AND HERZEGOVINA

17.1. THE LEGAL AND REGULATORY FRAMEWORK

In the recent period, there has been a significant improvement in our country in relation to the legislation. The policy in the area of telecommunications was adopted earlier, and it foresaw many solutions for the future organization of the telecommunications market. The Law on Communications has already been adopted, and it represents contribution to drafting other regulatory documents, in the aim of creating the market of the telecom sector on the basis of common principles that would be as stimulating for all subjects. The main purpose to these documents is to develop the telecommunications sector, create the necessary market environment that would provide a greater variety of services, better quality, lower prices of services. Also, the experiences of other countries indicate that enabling market competition in the telecommunications sector helps bring more investments and attract private and foreign capital to build the necessary infrastructure.

17.1.1. CREATION OF ENVIRONMENT FOR THE ICT INFRASTRUCTURE DEVELOPMENT

In addition to well-designed legislation at the state level, there are still some major problems in the implementation of the law at the lower levels of authority. The examples of passing legislation that directly influences the creation of infrastructure are numerous. One of such negative examples is the ordinance on public procurement, which imposed obstacles, and even stopped for a period of time the process of upgrading and expansion of equipment and software of some telecommunication systems. These provisions list the equipment and applications that can only be made by the original suppliers, for which the tender procedures needed to be organized several times in order to get three bids. The tender procedure had to be renewed, and special approvals needed to be provided by the related Ministries, which caused delays to the initiation of the realization of some projects for up to a year following the making of the investment decision. Since in this type of investments, the investment pays in the period of one to three years, the investments directly affect the business results of those companies.

Another example is charging the services of the Public Broadcasting Service through the fixed telephony bills. It is clear from the existing documents that the charge of individual telecommunication services is recorded separately and that the principle of calculation of costs for individual services is the ultimate goal of these documents. A more logical solution would be for this type of telecommunication service to be treated as a universal service, and, therefore, its finances should be dealt with appropriately. Such unprincipled examples of the actions of the executive authority lead to undesired effects, opposite to those from the listed documents.

The creation of the infrastructure is connected to getting the permits from the town-planning office, prior approvals, construction permits, etc, from the municipality level offices that due to the lack of understanding of the matter, its importance to the society, or the bureaucratic structure make great obstacles to the realization of the project and represents a sore spot of the implementation of the faster informatisation of the society. It is not a rare scene in some regions that the work of authorities is obstructed due to political discrimination, so that one local provider is allowed to build the infrastructure, while another is denied that right. One can also often come across unnecessary fears from the detrimental effects of the ICT infrastructure, problems with other public companies, the Electrical Power Company, the Railroad Company and the State Roads Agency in issues relating to the power supply and the right to place wiring in the area of their infrastructure, which causes additional hardships.

17.1.2. THE LEGAL FRAMEWORK

The area of telecommunications in Bosnia and Herzegovina is, at the moment, regulated by the new Law on Communications ("Official Gazette", No. /02), and the Policy in the Telecommunications Sector, as well as the decisions of the Governments of the Federation and the Republic of Srpska on the separation of the former Postal and Telephone Public Companies into the Postal Public Company and the Phone Public Company, and the Law on the Public Broadcasting Service of Bosnia and Herzegovina, or on the Services of the Federation of Bosnia and Herzegovina and the Republic of Srpska is in procedure. The Law on Communications, that is in force, regulates the issues from the area of telecommunications, radio communications and information technology, the method and conditions of the performance of telecommunication services and activities, the rights and obligations of the provider and users of telecommunication services, the building, maintenance and use of telecommunication infrastructure and equipment, radio equipment and telecommunication terminal equipment, management of the radio frequency spectrum, address and numerical space in BIH, electromagnetic compatibility, protection of data in telecommunications and performing control and oversight in telecommunications, in accordance with international treaties and contracts that are binding to BIH, and relevant guidelines and recommendations of the EU.

17.1.3. REGULATORY ORGANIZATION

The Law on Communications and the Policy in the Telecommunications Sector are the basic documents that define the operations of the independent regulatory organization in charge of the enforcement of the documents. The Policy in the Telecommunications Sector is aimed at the regulation of the environment in which the telecommunication operators will perform their activities. The Policy of the Telecommunications Sector is implemented by regulatory agency. The independence of the agency is related to its financing and the independent work of the operators which it oversees. Together with the legal documents, the CRA adopted a set of rules and regulation that represent additional progress in the regulation of the relations at the telecommunications market. The licenses-permits for the operators of the fixed, mobile, network and voice service providing operators were issued.

A large number of Internet service providers received a license to perform their operations. The issue of issuing licenses to cable TV operators was initiated, and the licensed for broadcasting organizations have been issued for a period of time. This will gradually bring about greater liberalization of the market, and with that the market competitions, which in turn should lead to the improvement of the conditions for the development and use of the ICT infrastructure. A general comment is that the Regulatory Agency has done a great work in the organization of the communications market. It can therefore be expected that its role shall remain a crucial one in the faster and more balanced development of this sector.

However, even with the significant progress in the area of regulation, there are several problems present. Even though the regulatory agency is independent from the telecommunication operators, the producers of equipment and services, there have been some inconsistencies in its work. The best example in the previous three years is presented by the work of the third, unlicensed, mobile communication operator in BIH. it is obvious that many companies are issued licenses without clearly specified technical requirements. Furthermore, some companies file the requests for approvals, without having even the basic infrastructure or conditions to perform those activities. This causes great variety in the quality of infrastructure development at the market, and in turn to the present of disloyal competitions and insufficient service quality.

17.2. SOCIAL ASPECT TO THE ICT INFRASTRUCTURE

The processes that shall clearly affect the market are the processes of the telecom sector privatization and liberalization. These processes are to create the favorable environment to the development and application of the ICT infrastructure. They all reflect various interests of different subjects that need to be harmonized. Notwithstanding the later ownership transformation, the current owner(s) of the network, as long as there is no competition, in the monopolistic position, and healthy competitive relations can be established by the introduction of new service providers to the market. Sound competition equals equality in rights. The next and most important step is the liberalization, creation of legal conditions for an equal approach to the market and fair competitive relations.

Other requirements that relate to this aspect are the right to information that determines the sovereignty and providing universal services, especially to the disabled and the poor.

17.2.1. TELECOM SECTOR PRIVATIZATION PROCESS

A characteristic of the privatization in Bosnia and Herzegovina is that there are three dominant fixed telephony operators, two of which are also mobile network operators. These three operators are owned by the entities, and not the state of Bosnia and Herzegovina, which presents specificity, as opposed to other countries. All three operators are licensed for international traffic, and have reached different degrees of privatization, namely:

- BIH Telecom 10%,
- Telecom Srpske 35%, and
- HT Mostar 25%.

At present, in addition to BIH Telecom and Telecom Srpske, that are licensed operators of mobile GSM networks, there is a third operator, Eronet – Mostar, that is not licensed, though it performs it operations. Eronet is fully privatized, but the legality of its privatization is questionable.

The privatization is supposed to realize several goals. One of them is income to the state budget from the sale of the entire state capital, which is not the ultimate goal. It is much more important to achieve the development of the ICT infrastructure in accordance with the need of the society. This is something to be had in mind, what is more in the state interest – ensuring the development of society informatisation, or a one-time benefit from the sale of the state capital share in telecom companies. This is the reason why it is advisable to the process of privatization to be related to the development of the necessary telecommunication infrastructure. As our country is still far behind in all aspects of development, it would be a good thing to simulate the development of and investments in the infrastructure, up to a level, and only then start with the major share of privatization. Only after having achieved the basic prerequisites for the development of the ICT, the creation of competition, market aspect of operations, etc, would become the priority. We should also have in mind other aspects of private enterprise for which we need to create a favorable environment, as well as for the stimulation of investing in telecommunication infrastructure, which in a special way also presents the privatization of the telecommunication market. As well as it is necessary to ensure the functioning of the providing of universal services in the process of liberalization, it is also necessary to ensure dynamic and effective development of the communication infrastructure in the privatization procedure.

17.2.2. LIBERALIZATION

The market liberalization process is aimed at the creation of equal conditions for all the market subjects, the effect of which should be market and cost-effective orientation of the telecom sector. The changes with the dominating operators that are necessary in this process are great, which is why the legislation and regulatory agency documents include

a three year adjustment period for this transition. The changes are related to the organizational, technical and technological, commercial and financial, and of course, human resources aspects. One of the changes is the change in the attitude of the dominant operators towards the user. It takes the creation of a special system of user care that includes all the necessary elements that will provide for complete satisfaction of the user with the services provided. Liberalization of the communication market has the obligation to meet all the financing requirements of providing universal services, in way that the price is as low as possible, or even free, so that they would be available to all layers of society, notwithstanding their social status.

Liberalization and its influence over the telecom sector is, in addition to the privatization and regulation, one of the processes that transform the monopolistic market into a liberal market. In a liberal market, operators work under equal terms, and the user chooses the desired operator. The transit to the liberal market is not easy or simple, and the problems are created by the existing market relations, resulting from the fact that the model of the organization of the current telecommunication infrastructure was established at a time when the network building presented capital investment that could only be made by the state. The investor, i.e. the state, was the owner of that one network, and therefore, the owner of the access section of the public market. In accordance with that, the end user was forced to use the network and the services offered, because there was no alternative.

The creation of an alternative network, especially of the access network segment, is extremely expensive and time consuming. Today, the access network is the most valuable segment of the network, because it is only through this network that the user can access other networks. This is why the existing access network is to be treated as public property that can be used by all users that provide communication services (operators), under equal terms, instead of its status of a private privilege. The laws need to treat all the technically possible methods of access and the operator selection:

- Call by Call: Before every call, the user selects the network, or the operator that will provide the service;
- Local Loop Unbundling: The LLU enables the operators to use the same, existing subscriber line with the help of which the users are connected to the public telephone network. It is a common case that an operator provides the public telephone service, and that another, using the same line, offers the broadband services (e.g. quick Internet access);
- Subscriber number transferability is another important component of the liberalized market. The number transferability enables the user to permanently use the same number, notwithstanding the network is uses, or the physical location of the access point;
- Local Loop Use, or the use of the subscriber line is of crucial importance to all the participants in the telecommunication market and presents the basis of the broadband network development.

Interconnection. The interconnections in telecommunication services present a legal, technical and economic framework of an agreement or a contract between two operators of telecommunication networks that enable the users to communicate with one another through the interconnected networks. As effective interconnection agreement is essential for the development of the today's global telecommunication network, that is crucial to ensure the market access and fair competition among the existing operators and service providers, and the new operators that are yet to enter the market. Interconnections for telecommunication network operators apply as an appropriate and efficient way for introducing competition, with no major changes to the local infrastructure. Many companies and governments, however, believe that the created competition network and

resale present an alternative to interconnections and a strategic business choice. The interconnection is a prerequisite for the creation of the market competition in a general liberalization trend.

17.2.3. SOVEREIGNITY ASPECTS

The access and participation of citizens in the information society is a basic for of society informatisation success. A general service includes the services that are understood as providing universal services that include:

- Development of the information and communication infrastructure in underdeveloped areas:
- The young and the school system as a priority of the information and communication technology development to achieve computer literacy. The young shall succeed in introducing the ideas of the information society and the use of information and communication technology to their families and homes, and thus to society in general, in the fastest way possible. The role of the school system includes providing satisfactory education in this area to the citizens of all age groups;
- The information and communication infrastructure presents the means to decrease, if not, remove the exclusion of citizens with special needs from the society, and improve the quality of their lives. In this area, BIH is quite different from the rest of the world, because the people with special needs and elderly – mainly pensioners – have very limited financial possibilities;
- With a lower price of general services, the citizens of the worst financial state need to be enabled and stimulated to use and participate in the developing information society. Such tendencies already exist in our neighboring countries, that we need to compare ourselves to in terms of the development degree;
- Enable all citizens to access and participate in the information society, by developing the information and communication infrastructure in the entire county, with special care for the young, people with special needs, the elder and people with small income.

17.3. GENERAL STATE OF THE AREA

17.3.1. INDICATORS OF NETWORK DEVELOPMENT

Basic indicator of the fixed network penetration in BIH is 950.000 users, which, with the estimated number of 3.700.000 general population, presents the penetration of 24% at the state level, with the characteristic that the percentage is higher in the urban areas, and lesser in the rural ones. This indicates that Bosnia and Herzegovina is somewhere below the average of the Central European countries (Slovenia 51%, Croatia 39%, Hungary 37%, Slovakia 38%, the Check Republic 40%, Poland 31%), and in the middle group of the South East Europe countries (Romania 19%, Macedonia 24%, Bulgaria 22%, Serbia and Montenegro 29%, Turkey 16%, Albania 25%, Kosovo 10).

However, this percentage needs to measures not by the number of users, but by the number of households. Namely, in the case of fixed network, practically all the household members have access to the service. If we take in to account that an average BIH family has four members, by simple math we get almost 100% penetration.

The mobile network penetration is 1.150.000 users, and presents 26% at the state level, with a disproportion of the post-paid and pre-paid users. It is crucial that the service for mobile subscribers is available at the entire territory of the country, with a special characteristic that this is possible through the functioning of temporary roaming at the state level, until the degree of coverage of 80% of the territory of roads and 80% of population is achieved. In some countries the number of mobile network users is almost

equal to the number of total population. It is expected that the same proportions will be achieved in our country following the introduction of added value services, the Internet, MMS and others, through the mobile network.

The Internet per the number of subscribers is at a very low level – 150.000, or with 4,5% penetration. Still, in relation to the total number of users, the estimate amounts to 10-12%.

There has been significant development of the cable network in the previous two years. These networks are of varying quality, and can hardly be awarded a common rating of the achieved development level. As the cable operators plan to provide the Internet and voice services, they must be taken into consideration in terms of the contribution to the entire development of the informatisation through the establishment of this type of infrastructure. These network belong to the group of broadband access networks, which renders them significant in terms of the set of services that can be provided thus.

Penetration of TV sets is extremely great, and we can be pleased in this sense. On the other hand, the cable TV is only staring to develop and at this time presents only the basis for the ICT infrastructure development.

Generally speaking, Bosnia and Herzegovina can be awarded two ratings in term of the ICT infrastructure. On one hand, the basic infrastructure (fixed network or TV sets) is available at a high degree, almost 100%. However, in terms of the technological basis, the opinion is that Bosnia and Herzegovina belongs to the group of less developed countries. It is important that the technological world trend is followed at least to a degree, but even with great efforts of telecommunication companies, the difference in comparison to the developed countries has not been decreased. The needs of the society and a relatively low level of social development show that rational and adequately directed investments in this area are immensely important for the entire process of society informatisation.

17.3.2. Types of Available Services in Bosnia and Herzegovina

In addition to the services provided by the telecom operators, that relate to their fixed, mobile and data transfer network systems, other added value services appear with the development of intelligent networks, that are increasingly applied in our country, but not in the same amount as in our neighboring countries. With the appearance of the Internet, a set of other services appeared, the web, e-mail, and other domestic and foreign services. We need to mention that GPRS is already being applied by the MOBIS mobile network operator, and is being prepared for introduction by BIH Telecom, which leads to the supposition that in near time the services based on location setting, the Internet and multimedia services will be available through the mobile network, in our country too.

Today, we can talk about the project of CIPS, State Border Service, both at the state level, that present important sings of significant uses of the ICT infrastructure for the needs of eGovernment. The change in the payment system organization has influenced the swift development of eBanking, or ePayment. The Chambers of Commerce have also recognized the great potential of this method of work, which is why presenting offer through eCommerce became the best method of communication among the business subjects. Creation of web sites and web pages is ever more present as a way to present the offer and company profiles of all types – private and state owned, production and service companies, education and health care institutions, utilities. Even with the above sad, we cannot be pleased with the total level of development of eBusiness operations in our country. Much more is needed for better and faster development of this method of work, and the ICT infrastructure is only one, yet crucial condition to achieve progress.

17.3.3. STATE IN COMPARISON WITH THE SEE COUNTRIES

The SEE region is not an area of significant improvements in the development and application of the ICT infrastructure, except in Slovenia, that in relation to all the indicators belongs to the top developed European countries. In terms of Croatia, it is obvious that great progress has been achieved in comparison to three years ago. This progress has, above all, been achieved by the programs of introducing the Internet and the informatisation strategy. A negative influence over the infrastructure development presented the privatization procedure in the HT, because the majority owner was not interested in investing in infrastructure, but to return previous investments. For that reason, the government of the Republic of Croatia intended to initiate the creation of its own information highway to influence the state informatisation directly.

The creation of a common backbone network is what needs to be done at the regional level. Such a highway would contribute to greater possibilities in interconnections and interoperability. It is sufficient to say that we have no backbone transport network at the state level, which sufficiently demonstrates what needs to be done. Furthermore, common pilot-projects that would be of common interest would be a further step forward in the development of the ICT. Control over borders, protection from terrorism, etc. are only some of the areas of possible cooperation. The region of former Yugoslavia, where there is no language barrier, is an additional chance for the development of common projects. With the harmonization of market conditions, the possibility of cooperation and development increases by far. It is beyond doubt that the initiation of an ICT Forum at the regional level would have significant influence over the desired changes in this area.

17.3.4. STATE IN COMPARISON TO THE EU

The EU countries are a long way ahead of the countries of this region in terms of the development and application of the ICT infrastructure, which is why we can say that they have already entered the information society we need to strive to. In order to overcome this divide as soon as possible, a great deal of work needs to be done. Still, there are certain advantages of this status of the SEE countries in comparison to the EU countries. Firstly, those are the standards and regulatory solutions that are already being applied in the EU. Secondly, the negative experiences of the EU countries need not be repeated in our case. Thirdly, the market conditions present a great experience that needs to be used. Next, the position of the state in the creation of a favorable environment and determining the policy is a priceless experience. The best illustrations are the licenses for the 3G operators in some countries with positive, and also very negative effects. The solution to the issue of developing and providing universal services needs also to be examined to get the right picture of all desired factors that need to paid attention to. Here we need to mention the European experiences in the liberalization and privatization processes, as well as the effects of those processes on the development and application of the ICT infrastructure.

18. DESIRED STATE OF THE ICT INFRASTRUCTURE DEVELOPMENT

Bosnia and Herzegovina needs to base the development of the information and communication infrastructure on general technological and market principles, by creating inexpensive, fast and secure infrastructure for its citizens and economy.

From the point of view of technology, this is a multi-service network, with a set of services that correspond to the needs of citizens and the economy, including broadband access and Internet access through the mobile network, a new Internet generation an a general mobile telecommunication system.

In respect to the market, this is an open, internationally competitive telecommunication market, open to investments and employment opportunities, for which a part of the products will be researched, developed and produced in the country. In relation to the citizens, this is access and participation in the information society, with the care for the young, people with special needs, the disabled, senior citizens and lower income citizens.

In relation to demands of modern telecommunication infrastructure, it is important to mention the need for and characteristics of services that need to be provided through that infrastructure. Above all, this is the need for broadband services that determines all the necessary parameters of the new generation telecommunication networks. Broadband is not a standardized value, but it can be roughly set as a five times greater value of the frequency specter than the basic bandwidth of 64 kb/s. As we have already mentioned, the requirements that characterize modern services are: interaction, mobility, intelligence, etc., and also the quality and service class. New generation networks and services are based on new technologies that make up the global information infrastructure we already identified as the SII – State Information Infrastructure. In the new generation networks, various types of information, media and services, for the purposes of cost and functionality, will be included in a single network platform. It shall enable the user to use several media simultaneously during communication and offer several services of desired quality, and thus it shall become a multi-service network.

The all-present informatisations, globalization and explosive growth of the Internet, with increasing demands for multimedia services, as well as the dislocation of data processing locations from their sources, demand the establishment of a convergent, multi-service telecommunication network. With its establishment, service and data providers, on one hand, and users on the other, would get an efficient, reliable and modern infrastructure throughout the territory of Bosnia and Herzegovina, as well its connection with similar systems in the world. In this way, we would provide:

- Better conditions for competitive operations of providers of various types of services, i.e. the offer of network operators, service providers and services would be expanded;
- Hierarchy and multilevel organization of VPN would enable the operators to offer their VPN services throughout the territory of Bosnia and Herzegovina, independent from the ownership in specific territories. Also VPN users would be enabled to create secured sub-VPNs within their VPNs, using the same equipment and without additional costs;
- The telecommunication area would be significantly modernized by introducing new technologies and with the development and application of new services and applications;
- Communication basis for the informatisation and eSolutions, as well as the open-society concept;
- Transport of multimedia programs in real time, where the infrastructure used for VPNs could at the same time be used as transport network of radio and TV signals, as transport for cable TV or as the beginning of the use of IP TV solutions and radio broadcast through the Internet;
- With balanced development of the IC infrastructure in the distanced and “small” communities, and not only urban centers, we would provide for equal resources for the

development of these communities, and decrease the demographic pressure over the urban communities.

18.1. General Vision of the New State

A generally available multi-protocol and multi-service transport system, with a modern concept, should present an attractive, reliable and financially favorable choice for all those that need to transfer various types of data with a flexible quality of data, speech and multimedia transfer system, throughout the territory of Bosnia and Herzegovina. In that sense, the infrastructure needs to possess the following characteristics:

- The infrastructure covers BIH equally;
- The infrastructure is developed while taking the trends into consideration;
- The infrastructure is the basis for services, including the e-type services.

18.1.1. Convergence and NGN

Presence of a large number of communication systems and the inevitability of their connection led directly to their convergence. An example of the convergence can be found with the fixed and mobile network, the satellite and fixed network, the Internet and the fixed, and now also mobile network, TV and the Internet, etc. The challenges posed by the convergence process before the development of the ICT infrastructure are great and inevitable. The solution in the application of technology and technical systems includes thorough understanding of those demands and, especially, complexity of managing these systems. The telecommunications are dominated by their digital realization and program flexibility of all systems, with the application of optic fibers for great capacities of information transfer capacities.

The result of convergence is the harmonization of the number of users in the fixed and mobile network that resulted in a greater number of mobile users, than the fixed, in many countries. The number of users, in relation to the application of services, is also harmonized in the fixed and mobile networks. Finally, with the development of technology, the Internet is becoming increasingly applicable in mobile networks, which is why it can be expected that the number of Internet users in the foxed and mobile networks will become equal. This will result in changes to terminal devices, with the trend to unify the functions of several terminal devices, the telephone, fax, PC, video camera, handset, etc, in a single device. We might conclude that the result of the convergence is most visible in terms of services. Providing voice services, data transfer, e-mail, fax, etc. is in accordance with the UM (unified message) principle, which means that the services are available in all networks, various terminals and different platforms. The creation of the convergent environment is, of course, a complex task. That is why the convergence is one of the issues in the Strategy of the ICT Infrastructure Creation.

So, the focal points of the modern telecommunication points are the network convergence and the network transparency. These are natural directions of telecommunication networks resulting from the needs of users. The technological development enables the transfer from the separate networks of the current time to multi-service networks that are the aim of the telecommunication system.

18.1.2. Convergence of Telecommunications, Computers and Media

The network architecture is composed of user equipment and terminals, access networks and core network. Up to this time, we had a separate network for every type of service, defined by different technological solutions of directions and transport. On the other hand, the user does not want to buy technology. He wants to buy the simplest service possible that will enable him to exchange information of any nature (speech, image, data). To satisfy such demands of users, we need multi-service network that needs to meet the pre-set criteria:

- Transparency for all services and all previous technologies;
- Flexibility in terms of development;
- Modularity in the sense of free replacement of technological solutions to realize any service or network segment;
- Limitlessness or independence from the number of loops;
- Limitlessness in terms of space (in relation to both architecture and range);
- Satisfactory permeability for all services and especially real time services;
- Cost-effectiveness in relation to usability of the available range with statistical multiplication and dynamic assigning of available range;
- Resistibility to breaks and disturbances of dynamic character;
- Reliability in terms of guaranteed transfer;
- Tolerability of bursts in traffic – uneven distribution;
- Openness to connections with other networks via standardized interfaces and protocols.

There are three basic parts of the future multi-service network: the portal, access and transport (backbone) network. Each of the listed parts of the multi-service network has a layered structure in accordance with the three-layer model. It is clear that the applied technological solutions directly depend on the functions of the individual layers of each part of the multi-service network, their complexity and mutual competition. The possible existence of a larger number of technological solutions for the realization of a function, layer or network directly influences the network topology. For the purposes of ensuring complete transparency in relation to services, the electric and optic commutation will be simultaneously present in the multi-service network.

18.1.3. PORTAL NETWORK

The portal network of the multi-service network, with its service layer, must, above all, ensure the communication and support of presentation aspects of traffic exchanges among the user application in a way acceptable to all users, due to different applications and equipment producers. The ISO and ITU-T have developed the presentation and transfer syntax, ASN.1 (Abstract Syntax Notation One) that is used at the ISO model application level. This notation defines the abstract syntax for the type and value of data, and together with the BER (Basic Encoding Rules) it describes the actual data presentation.

The development of the portal network technology does not necessarily lead towards the actual convergence, and the different technological solutions will remain supplemental for a long time, instead competing with one another, which is why the operators will not be in a position to decide which technology to use. On the other hand, the operators use technical and administrative logic in the differentiation of telecommunication services. From that point of view the services are divided into basic, supplemental and added value services. Taking into account the increasingly differentiated user needs, it can be expected that the telecommunication services in the area of supplemental and added value services will basically diverge. It is therefore, irrational to ask for a convergent platform for the portal network.

18.1.4. ACCESS NETWORKS

Historically speaking, access networks, realized in any technology, include a subset of functions of an entire network that enable the connection of the user to a transport network in the widest sense possible, either a public substituted telephone network (PSTN), a public mobile network (PLMN), ATM, Frame Relay Network, the Internet or a

different solution. They all inevitably include the interfaces and protocols that can connect various access devices.

That is why all known User-to-Network Interfaces and belonging protocols integrated in network ends need to exist at this access network layer, depending on the transport media and the type of service.

About the direction level of access networks we can say that, considering the basic function of this layer, it is of pretty moderate capacity, limited to specific types of end, concentrating loops. The transport layer of an access network is composed of a transport media and a corresponding line code the form of which depends on the transport media and the terminal equipment. The general digitalization process and advanced technological solutions related to various types of terminal equipment resulted in an increase of the efficiency of access network use in relation to the originally planned efficiency.

So, in this concept of access networks, PSTN is only one of many major services between the user and the edge commutation device. For the modern point of view, there are no technological dilemmas in NGN multi-service access networks, due to the obligation of complete transparency of network to all services. It is necessary to ensure the functioning of all protocols and interfaces. In relation to all indicators, there is competition present among all services, technologies and operators. This is why all technologies are equal and can be recommended with no discrimination. This issue is open in relation to possible quality and type of services offered. What remains, then, is the principle of broadband (speed and capacity), interaction notwithstanding the technologies and operators, and of mobility.

18.1.5. TRANSPORT (BACKBONE) NETWORKS

In multi-service networks, the backbone network is composed of the transport medium, the transport platform and appropriate gateway media as the interface between the other two parts (portal network and access network) of the multi-service network. The transport network, with its technological solutions, defines the topology of the multi-service network. Without special elaboration, aware of the existing technologies and topology performances, we can undoubtedly say that the multi-service (convergent) network will be developed in loop topology and optic transport systems.

While respecting the multi-service principle, as a basic characteristic of the transport network, the service layer of the backbone network needs to provide the transport function to the portal, access and mobile networks. In other words, it needs to offer the transport services appropriate for every type of telecommunication service, in the total realization of telecommunication network. Those transport services include: the entire range of the TDM range, from 64 kbps to 10 Gbps, and more, various types of fixed and variable lengths of packaging frameworks, virtual circuits with constant or variable speed, bit series transport protocols, appropriate compressions algorithms, etc.

The realization of layer of directing transport network depends on the service logic chosen for the backbone platforms. This transport network layer, among other possible backbone networks: Ethernet, X.25, Frame Relay, SLIP/PPP, PSTN/ISDN, PLMN, ATM, leased lines, etc., needs to offer transport platforms based on circuit commutation, ATM cells, or IP packages mapped on optic transport systems. Considering the method of association of the information channel to a service, the layer of transport network direction is divided into commutation in which:

- The circuit is associated to the line during the connection (connection-oriented). This type of circuits is divided into the physical (leased line, or a reserved cyclical circuit) and virtual (the physical path for a line is provided on the basis of identification of the channel from one to the other loop). If the logic channel is

permanently associated to the line it is then a Permanent Virtual Circuit, if it is associated only during the user request, it is a Switched Virtual Circuit; and

- The loop associated circuit (connectionless). In case of these circuits that are simultaneously used for several lines, each frame needs to contain the address information to direct the line.

The transport layer of the backbone network in future multi-service networks is composed of optic cables as the transport medium, adequate modems (with the tendency to fully optic networks), and adequate add/drop multiplexers, depending on the modem type (SDH or WDM).

The operations that demand greater processing power, such as analysis, sorting, classification and filtration occur at only one place within the transport network in the MPLS mode of operation, at the entrance side of network, at the edge concentrator. Unlike in this concept, in case of the ATM networks, the extremely demanding processing of the entire head to determine the VC for every cell is done separately in all ATM switches on its way, which a much worse concept from the point of view of processing power of the transport device. On the exist side of the MPLS device, the labels are removed, and the packages are forwarded to their final destinations, in the form in which they entered the transport network.

18.1.6. MOBILE COMMUNICATIONS

GSM radio channel is the basis of the digital wireless access of mobile communications. It enables the transport of data with low speed (9,6 kbit/s), and the short message services. The Internet access via 2.5G GPRS network solves the wireless application protocol. New solutions are brought by the universal mobile telecommunications system, and other types of wireless loop. The universal mobile telecommunication system belongs to the third generation of mobile systems, that are developed within the concept of international mobile telecommunications, IMT 2000, defined by the International Telecommunication Union and standardized within the European Telecommunications Standard Institute. The migration from the GSM system to the IMT 2000 will take place over the several following years to capitalize the investment of operators in the current systems. There are several techniques for operators to evaluate or migrate from the current systems to the IMT 2000 technologies. Operators have to consider the optimal transition and perform the financial and technical analyses before making decisions. Many mobile network operators have clearly defined their evolution paths from to 2G, through the 2.5G to 3G. The most powerful drives for the introduction of 3G, especially in the developing countries, are:

- The data market projection;
- Interoperation of 3G and the GPRS/GSM;
- Evolution of special content services;
- Development of data transport services;
- Competitiveness of wireless technologies with great flows, in relation to wire approaches.

Moreover, the characteristics of the 3G mobile communications are: global character, possibility of easy introduction of new services, interoperability that allows for the evolution of the existing systems and flexibility. IMT 2000 can offer many more services, than other mobile systems. The description of the 3G system is similar to the GSM system, and is composed of the radio access and core network.

In the widest sense possible, the evolution/migration towards IMT 2000 is characterized by the method in which the operator applies:

- The core network with links to PSTN, ISDN, Internet/Intranet and external mobile and data transfer networks;
- The radio access network, working with the possibilities of using several bandwidths and complementary radio technologies, and
- The dual-mode or multi-mode terminals that allow the user to receive services from the existing GSM networks and the IMT.

If the operator intends to advance the system, it needs to evaluate the target system and to analyze what parts of the system need to be modified and to what degree, as well as what resources (the specter) can be put to various uses or modified. In accordance with the ITU-R Recommendation M.1308:

- "Evolution" is defined as the "process of changes and development towards the advanced characteristics, while
- "Migration" is defined as "transfer of users and/or services from the existing system to an new one."

18.2. Basic Segments of the New State

18.2.1. Desired State of Capacities

Basic indicators of the desired state would be expressed in the physical infrastructure capacities as measured per 100 citizens, such as:

- Fixed network penetration at the European average level, which would amount to 35% by 2007, and 50% by 2010;
- Mobile network penetration at the European average level, which would amount to 80% as early as by 2007;
- Penetration of the Internet users is at the level of the countries in the region, or 20% by 2007, and 35% by 2010;
- Internet penetration through mobile (GPRS, EDGE, UMTS) network, which would amount to 25% by 2007, and 50% by 2010;
- Penetration of the cable TV is at the level of the countries in the region, or 20% by 2007, and 36% by 2010;
- Penetration of the analogue TV users has already reached almost 100%;
- Penetration of digital TV and interactive TV at the level of 25% by 2007, and 50% by 2010.

In addition to the indicators of physical infrastructure capacities, indicators of applied and used technologies are also of importance:

- Number of ISDN line users per 100 lines, 10% by 2007, and 20% by 2010;
- Broadband access per 100 lines, 5% by 2007, and 15% by 2010;
- Number of GPRS, EDGE or 2.5G mobile communications users 25% by 2007 by 207;
- Number of UMTS (3G) mobile communications users, at the level of 10% by 2010.

Furthermore, the number of business networks, service systems, such as VPN business system networks, then individual public service systems of the Government, health care system, education, information, economy, culture, sports, tourism, etc. are some real indicators of the reached level of society informatisation.

18.2.2. Multi-Service NGN Network

The telecommunications are dominated by the digital performance and program flexibility of all systems, with the application of optic fibers for large capacities of information transport. The network architecture is composed of the user equipment and terminals,

access and core network. The local loop is a physical medium that connects the user equipment with the local communication loop in the access network. Considering that NGN networks need to satisfy the communication needs of a wide specter of users, they have at least a dual task:

- To realize a broadband, reliable, highly available communication infrastructure for data transfer as the platform of the strategy of BIH society informatisation;
- To be the core of the future creation of a convergent, multi-service transport system for package telephony – both foxed and mobile, and the 3G network of mobile communications.

That is why there is a proposal to create a network with:

- Package commutation – due to the nature of original traffic serviced;
- Statistical multiplication – a much greater degree of use of the installed transport volume.

The realization of the transport network with the suggested principles would need to possess the following characteristics:

- Convergent – one hardware platform for optimum transport of all package services and protocols;
- Real-time voice – fixed and mobile package telephony, and H.323;
- Real-time audio and video;
- Multimedia;
- Internet services, etc.

The current concept "one service group, one network" of network creation is surely not an optimal one, because the share of network creation in the cost of individual services is relatively high and because the maintenance of this system is expensive and complex.

- Multi-service – A multi-service network is not just about comfort. Most successful service providers are preparing for a new method of work that includes the sale of IP services of higher value, and not only their transport. Most of the providers' income from the data transport came from the Frame Relay service (privacy of data) and the ATM service (extremely high level of quality of service). In the following period we can expect significant increase of the Internet traffic and the number of users. The key issue then becomes how to create new or even better, adjust the existing transport networks to offer higher value IP services.
- Multi-user – They need to enable the connection to the net for any user, with various speeds and service qualities they may demand. In addition to that, it is necessary to provide simple and limited interconnection among the VPN networks.
- Flexible – Any changes in the location of network devices within the user network should not require changes in the configuration, nor any interventions on the transport network. Through one physical line, the users can realize several, fully independent logic private networks. The changes of the volume at the user location or the protocol type should be made on-line and within the day.
- Scalable – To satisfy the current transport needs, while respecting the available standards, but not to become a bottleneck for future expansions. Everything built "today" needs to be easily expandable in future.
- Broadband – Provide broadband access to the ultimate user and sufficient volume of permeability in all network segments. By applying the xDSL technologies, the access speed of 2 or more Mbps per one user location will be provided in the access network.

- Highly available – The precondition is to provide more than one route for any line, i.e. link, using the technology of multiple rings and redundancy of all essential functions of transport network devices. It provides very flexible possibilities of guaranteed quality of service and system maintenance through the DPT and IPS technologies.
- Safe – They need to provide full protection of data in the basis of the user, physical or logic line. The planned network technology itself completely disable unauthorized access to the network between the end users, and the users need to apply simple data encryption to protect the data from possible abuse within the network providers.
- Optimal – It needs to provide sufficient capacities for the needs of BIH market, but with the possibility of broadband access with the least price possible, and thus significantly reduce the communication costs for the users.
- More widely distributed – Under identical terms (with identical services and protocols, and optimum capacities), in its final variant it needs to connect 149 municipalities of BIH.
- Quality of Service and Class of Service – The network needs to be able to identify at its entrance up to 64 classes of service, and to provide adequate quality of transport for each of the services, in accordance with the pre-defined policy.

The transport backbone network is composed of interconnected communication systems that perform the switching and directing of information flows. The physical transport medium is predominantly made of wire, and in a smaller part executed by radio systems. The core segment of BIH network is fully digitalized, with a major share of optic transfer systems of great capacity. In one part of the network, the Asynchronous Transfer Mode is used for broadband communications. Constant connection is realized through leased circuits that allow greater data transfer speeds. Together with public networks, there are private ones in large business systems, dedicated to their specific needs and functions.

18.2.3. ICT HIGHWAY

The aim of the Global Information Infrastructure is to provide access to the information society to all citizens through the interoperation of networks, the information and application processing system. The realization of these goals will enable the basic principles of the Global Information Infrastructure that includes stimulating fair competition, incentives to private investments, defining an adjustable regulatory framework an ensuring open network access. At the same time, by the realization of the listed goals, the services and access to services will be ensured at the universal basis, the equal possibilities for all citizens, variety of content, including the language and cultural diversity will be promoted, and the need for global cooperation will be acknowledged, with special attention to the less developed countries.

The ICT highway needs to be composed of optic highway networks of dominant operators, combined with network of alternative operators, such as the electrical power company and the railroad company. The implementation of this highway for the needs of information society needs to be considered through three aspects: the technical, economic and regulatory aspect.

The technical aspect demands that the operator networks in highways be equipped with the NGN technologies that enable easy interconnection of these networks. The installed or planned optic cables with all three dominant operators have sufficient capacities to accept both working and reserve routes. The ICT highway needs to have a combined meshed architecture, with the provision of physical capacities through rings. The networks need to have defined requests in relation to the Operation Support Systems to

enable harmonic execution of managerial tasks and the protection of traffic at the physical and at the logical level.

The economic aspect demands the considerations of total highway capacities at the level of BIH, so that investments are not made in doubled capacities. Operators need, in that sense, to adjust their tariff policies.

The regulatory aspect of these interconnections needs to promote the common use of capacities and the methods of managerial information exchange.

18.2.4. BROADBAND ACCESS NETWORK

In terms of requests in relation to the modern telecommunication infrastructure, it it especially important to iterate the needs and characteristics of services that need to be provided though that infrastructure. The first place belongs to the need for broadband services that determine all the necessary parameters of the NGN. The broadband is not a standardized value yet, but roughly speaking its frequency specter value is five times greater than the basic bandwidth of 64 kb/s. As we have already mentioned, other demands that characterize the modern services are: interaction, mobility, intelligence, quality and the class of service, etc. New generation networks and services are based on new technologies, that make up the Global Information Infrastructure that can also be defined as the State Information Infrastructure - SII. In the new generation networks, various types of information, media and services, due to the price and functionality, will be encompassed with a single network platform. It shall enable the user to use several media at the same time, during communication, and offer him several services of selected quality, so that the network will become a multi-service one.

18.2.5. THE INTERNET ACCESS

The general acceptance of the Internet is definitely the biggest lasting support to its development. It is thought that the new sources of stimulation might be:

- Mass quick access on the basis of the digitalization of the user loop and other broadband technologies;
- New generation of mobile communications;
- Web server appropriate for integration in any device;
- Portal as a unique interface to access information, products, services, and
- Various forms of eBusiness.

The new Internet generation seeks the high performance solutions, including: faster and more diverse access, faster core network, powerful, adjustable and self-configuring equipment and applications, new and integrated services, easier to use and with defined quality. The basic development steps include the following: increase of speed, group communication, and with logic sub-networks for the existing Ipv4 network protocol, security functions with the IPsec protocol and the introduction of the new Ipv6network protocol.

The users access the Internet through the public network or through private, corporate (local) networks in companies and organizations. The access via the telephone network, ISDN or ADSL, is realized by the call of the ISP. This is not a long-term solution for more demanding applications and multimedia services, but is and will be for basic services. A leased line for permanent Internet connection is appropriate for companies and organizations with a bigger number of users and demands for greater speeds of data transfer.

18.2.6. MOBILE COMMUNICATIONS (EVOLUTION/MIGRATION OF THE GSM SYSTEM)

The GSM industry, with its logical and standardized method, set its evolution path towards the IMT 2000. It includes to possibility to upgrade the system to the GPRS/EDGE

or to introduce the IMT 2000 Direct Spread (UMTS), or by application of both paths. The GSM system, designed to support voice systems and data services, is composed of the Core Switched Channel Network, BBS for radio access and a mobile terminal. The most important characteristic of the GSM is that it possesses standardized open interfaces that enable procurement of all elements of the network from different vendors.

In order to advance the possibilities of data transfer, the GPRS is added, that enables always on connections of great flows (up to 171 knit/s), with the data transfer network. With the new IP network elements, the package commutation is added to the existing GSM in the core network. This extension provides the basis for the use of common core network in the later migration to UMTS.

18.2.7. RADIO AND TV DIFFUSION OF MULTIMEDIA SERVICES

In relation to the radio and TV diffusion, we need to rely on the direction of the technological development from the analogous to digital HDTV and the interactive TV. In that aim, we need to ensure adequate infrastructure that supports the global service of the public broadcasting service to fulfill its social role and establish the market services in the sense of general needs of the society informatisation development. The development of the broadcasting service is based on three basic systems: the terrestrial radio system, satellite and cable broadcasting systems. All the aspects are applied in our country, but each of them has a different level of development achieved and different conditions of future development.

A global conclusion might be that the terrestrial radio system, notwithstanding its public or private character, has developed for the longest period of time and already possesses established infrastructure. Even though the broadcasting infrastructure is not balanced, either in the signal coverage quality, or in relation to the technologies applied. As there are strategy projects of the development of the broadcasting service at the state level, it seems that progress can be made in a short period of time in that area. It is evident that there are already plans to introduce digital TV and the also interactive TV that includes the use of a program guide. The necessary infrastructure is to be base on the adopted world standards, such as MPEG, H.232, etc. In addition to studio equipment, the key component of development, of course, is the mobile equipment that is to ensure quality distribution of signal to all parts of the country.

The satellite systems have developed individually, and without a specific social stimulation and direction, mostly due to the lack of clear policy in this area. With the increase of interest in information by our citizens abroad, as well in the countries of former Yugoslavia, satellite broadcasting gained importance. The lease of satellites for the broadcasting of domestic production is, by all means, important, both for our citizens abroad, and to inform the international public on the current events in our country. On the other hand, the globalization process includes the need to inform our citizens on all the events in the world, independently, from several sources, to get a clear image of all current events. Of course, satellite systems have multiple roles in other communications too: voice, data, image, Internet transport, etc. Individual satellite antennae are relatively expensive and do not have a sufficient number of services. As satellite systems appear to be solutions for several sets, the groups of users are connected into special local networks.

Cable TV began to develop in our country before the war, more as common antenna systems, and not real cable TV. After the war, this service develops with great speed in Europe, above all due to the liberalization of the market and the possibility to provide other telecommunication services through the infrastructure. In the US this type of infrastructure has long been developing independently from the telecommunications. With the development of technologies, all communication services are offered in all systems,

which is why both in America and in other parts of the world, these two components of electronic communications appear as competitors at the market.

19. THE ROAD TO ACHIEVING THE DESIRED STATE

The Study Group 1 of the ITU-D prepared a report in September 2000 on the promotion of infrastructure and the Internet use in the developing countries. The SG-1 directed its work towards three issues:

- Preparation of a set of guidelines for government officials to be used in the creation of policy for establishing the environment that would support the development of the Internet infrastructure;
- Identification if the available technological options to achieve the development of the Internet, a technologically neutral guide for the Internet development option;
- Determination as to the best method of establishing sufficient human resources for technical expertise in the private sector and among the developing countries officials.

Inexpensive, fast and secure information and communication service provided by adequate infrastructure would present an ideal solution for everyone: users, operators and the entire society. To build the inexpensive, fast and secure infrastructure by the creation of the information and communications market with competition in the providing of all services, by directly influencing the application of new technologies and introduction of new services by telecommunication operators and service providers, by stimulating research, development and production of information and communication equipment and services, and the operation of the existing and attracting new companies from the area of high technologies.

Directing and monitoring of investments in the development of the information and communication technologies towards the multi-service network with a set of services appropriate to the needs of citizens and economy, including the broadband access and the Internet access in the mobile network, new generation of the Internet, broadcasting services and general mobile telecommunication systems. The care for the terms of equipment procurement for the operators and service providers partly of completely owned by the state, government institutions on one hand, and also the public sector, economy, public or state companies and citizens.

The preparation of the introduction of a general telecommunication system of the new mobile system generation, such as GPRS; EDGE and UMTS in the period of 2004 to 2007, in accordance with the EU dynamics. Increase of the number of operators of mobile networks by issuing three licenses for mobile networks at the state level. Introducing the broadband access t the state level to support demanding services and applications, especially of the companies with international activities.

The establishment of the information and communication highway at the state level would be linked to the regional centers of the SEE countries, thus establishing the common backbone of the SEE countries. The basic backbone infrastructure, built on the telecommunication optic networks based on the ATM, IP and MPLS platforms, would contain the components of a multi-service connectivity network. All the core networks, both private and public fixed, mobile, package, computer and cable networks would be linked to this network. This network would basically be open and technologically independent, and in it the traffic for all kinds of information would be realized, either on the end-to-end or multi-cast principles.

19.1. RECOMMENDATIONS TO ACHIEVE THE DESIRED STATE

19.1.1. THE STATE INFORMATION INFRASTUCTURE OF BOSNIA AND HERZEGOVINA

The realization of goals and tasks set by the general concept of the Global Information Infrastructure is realized in each country by defining the State Information Infrastructure (SII) that defines the necessary conditions so that the infrastructure could fulfill all the needs and requirements of a country. To make it simple, we need to define the concept of the SII. From a set of definitions, we chose quite a wide one, that says: “The State Information Infrastructure needs to ensure free interconnection of communication

networks, computers, data bases and electronics consumers, that will link together homes, work places and public institutions and thus enable easy use of a great volume of information." It needs to include all the means of creation, transport and use of information.

The creation of the SII needs to meet the following principles and goals:

- To promote the private sector with the help of an adequate tax and regulatory policy;
- Widen the concept of "universal service" so that it could provide anyone with the information service at a reasonable price;
- To serve as a catalyst for the promotion of technological innovations and new applications;
- To facilitate free, user initiated activities in the information infrastructure. Since the SII is a network made of networks, the information transfer need to be easy and efficient for users;
- To ensure the security of information and reliability of networks;
- To improve the management of the radio frequency specter;
- To protect the rights to intellectual property;
- To coordinate its actions with other governments, because the information cross borders easily, in the aim of removing possible obstacles;
- To provide the access to government information and improve the government procurement function.

Changes in this area happen dynamically and almost on a daily basis, reaching from the technology to the legislation. This is why governments need to start working together with the private sector and other interested parties with the aim of adequate organization of the telecommunication infrastructure development. The importance of the realization of the above-mentioned goals can be realized through the possible future changes to our lives, such as:

- Best schools, teachers and courses available to all students, notwithstanding the geographic area, distance, means or disability;
- A vast portion of arts, science and literature available anywhere, not only in libraries, museums and galleries of big cities;
- Health care services and response of other social institutions available on-line, with no waiting time, when and wherever needed;
- Small producers get electronic orders with specifications for their products from all around the world, so that they can put their production capacities to best use;
- It is possible to see a latest movie, play a latest video game, go to the bank or go shopping without leaving one's home, at any time;
- It is possible to contact the government electronically, and get all the required information, etc.

19.1.2. INFORMATION INFRASTRUCTURE INTRODUCTION MODEL

A country's information infrastructure represents an indicator of the development level of all social and economic relations, but also the modern need of all developed societies. It reflects the computer network systems in their entirety, meaning the physical, communication and programming sense. Also, the entire service offer provided by those networks, that enables various operations and the creation of new services that the market demands, also belongs to the information infrastructure. The possibility and quality of the information infrastructure is also greatly influenced by the technologically

applied solutions, in the sense of technology selected, because they are the basis of the entire technical level of the infrastructure.

Starting form the fact that the computer networks, with their resources, are the actual basis of the information infrastructure, in the event of the model creation, for any purpose, it is necessary to provide full permeability or end-to-end connectivity of the network, and also free and reliable operations for all users. To realize that, we need to use the logic of the OSI systems, and also to set the standards that will completely provide for the basic interconnectivity and interoperability tasks. By that, we need to keep in mind that the operation of computer system is mostly performed though a layered structure and that all activities take place in appropriate layers.

We have already talked about the layers and layer structuring methods in previous chapters, and the provision of layers with appropriate protocols is also familiar, depending on the role of a layer in the realization of a task set before the network. Considering that, it is necessary to keep in mind this layered network structure at the very defining process of the network, depending on the purpose and the network type.

With that aim, it is necessary to prepare a so-called reference model for every specific category of applications, that represents a framework of selected standards that provide for full communication functionality. A reference model is, basically, the structure of the future network that needs to be considered and prepared at any network defining activity. Here, all the crucial network layers are defined, as well as the important tasks that the network needs to realize. In other words, this means that it is necessary to define the layer filling, select the services and choose the protocol in accordance with the type of demand set.

Following the definition of a reference model, it is necessary to define the network architecture that presents a combination of standardized services and protocols, again, on the basis of the OSI layer standards. In other words, the architecture represents a somewhat mode defined reference model, in which the inner structure every block, or model element is further developed. The layer standards and protocols are defined as a sub-set of OSI layer standards that can realize the goal service within the set network. So, for the purposes of the realization of a specific function in the computer network, such as multimedia conference or a management system, etc., function profiles are defined. Those are specially organized sub-sets of the OSI layer standards that need to provide the interconnectivity and interoperability of individual segments and network elements that participate in the realization of special user needs.

Since it is obvious that every of the listed activities, in a way, is based on the use of standards, it is evident that they are, actually, the key elements which, if properly and entirely defined and combined well, enable the realization of the set task.

19.1.3. NGN – NEW GENERATION TRANSPORT NETWORKS

This approach demands the rationalization of the existing infrastructure, because the efficient use of expensive network resources is of extreme importance in the competitive environment. Therefore, convergent networks, and especially NGN ones, need to be transparent in relation to all services, programmable and flexible to future development and expansion, intelligent with regard to traffic engineering and the added value services, acceptable establishment and maintenance costs, etc. The operators are suggested the following:

- Development of technologies applied to telecommunications, especially those expressed by the permeability volume capacity, intelligence and universality of signal protocols and commutation speed, will directly influence the defining of the logic and physical topology of the network;

- The need for more efficient networks in the economic sense, as a consequence of the appearance of competition in the area of telecommunications, will condition the development of the technological solutions in the direction of convergence of now technologically completely separate networks for the transport of voice, data and images. The service convergence, although technically possible, will not be completely applied for a long time because the practical application in these segment is influenced by users, and not operators;
- From the point of view of network topology, the convergence concept, in addition to the transparency in relation to all services and protocols, needs to satisfy the conditions of traffic engineering that are basically contained in the minimum (zero) information loss during the transfer through the network and conditions of service quality that are basically contained in the minimum (mostly propagation) delays;
- The permeability volume available in the modern optic cable technology, of the 20 Tb/s value, does not present a limitation even for the most demanding services (digital TV), or for any convergent service combinations. Signal protocols, based on robustness, modularity and flexibility established within the OSI model basis (such as SS7) can exchange, with satisfactory speed, all the information needed to reserve the network resources and manage the traffic. The basic limitation for the establishment of fully convergent network, with loop logic topology, are the commercially acceptable technological solutions for the network loop, both in relation to the loop forwarding speed, and in relation to the speed of identification of requests individual traffic flows carry;
- By taking the IP as the generally accepted platform of the future convergent networks, multi-layer commutations represent a satisfactory solution for the purposes of defining the logic and topology of telecommunication transport networks. MPLS, as the last in the multi-layer commutations technological developments, is based on the control-driven model of network topology, and on the principle of label change (including the possibility of hierarchical organization of label change – the tunneling), includes all the good qualities of IP routers and ATM commutations. Therefore, the MPLS possesses an entire set of comparative advantages in relation to other possible solution for the creation of a convergent telecommunication transport network;
- New operators should base the topology of their networks on the convergent platform established with the help of MPLS and incorporated directly into the optic cable. The existing operators need to set the dimensions of the convergent platform of their transport networks in accordance with the traffic type ratio (voice – data), and depending on the degree of efficient use (return of funds invested), and effective operation of the applied technologies;
- We can only claim that the technological development of telecommunication is a fast and unstoppable process, and that, depending on the technological stadium (as has been so far) the topological solutions will be cyclically changed (point-point, star, ring or loop technology) in the transport network. From the current prospective, the winner of the network convergence game will be the one who efficiently implements the quick IP routers directly in the DWDM network or directly into the fiber, while keeping the existing users and protecting their earlier investments.

19.1.4. THE INTERNET

The application of the Internet is aimed at the increase of the distribution of the basic services, by using the public network and ISPs, and introducing advanced services, with the academic and research network (BHARNET) as the promoter of the new generation

of the Internet. Accepting the priority measures from the eEurope 2002 Action Plan, for a cheaper and quicker Internet access includes:

- Introducing total competition to telecommunications, including the local access;
- Lowering the Internet access prices and the decrease of the leased lines tariffs;
- Competition increase;
- Introduction of IPv6;
- Assigning frequencies to multi-media wireless systems;
- Joining the European activities for secure infrastructure, and accepting priority measures for the eEurope (2002 and 2005) Action Plan;
- Increase of the availability of technologies and products for secure transport from the IPsec, and
- Ipv6, and protection of privacy;
- Introduction and application of smart card;
- Coordinated approach to preventing electronic crime, and
- Protection of copyright, preventing the providing of inappropriate content;
- Defining licenses for service and content providers;
- Harmonization of operation requirements for operators and executors of infrastructure creation, etc.

19.1.5. MULTIMEDIA SERVICES BROADCASTING

Media have joined the convergence processes with the application of digital technology and computer activities for media processing, and the design and production of content, including event the most demanding aspect of cinematography, television and computer games. The entertainment industry, as the new dynamic production sector was thus created. New standards and information compression techniques enable efficient and scalable moving image and sound digitalization, opening up the possibilities for new services of digital radio and digital television. By that, the need for the information and communication technology, computers, media systems and networks to treat that information differently than others is eliminated. As there is no satisfactory realization of the cable TV network in our country, we need to stimulate the solutions of digital television in the convergent environment.

So, with regard to the broadcasting, we need to rely on the technological development direction from the analogous to digital HDTV and the interactive TV. In that aim we need to provide adequate infrastructure that supports global service of the public broadcasting system to fulfil its social role and establish the market services in relation to general needs of information society development. The development of the broadcasting system is based on three basic services, the terrestrial radio system, satellite and cable broadcasting systems. All three of these segments are applied in our country, but each of them has reached a different level of development and has different conditions of the future development.

19.1.6. SECURITY ASPECTS

Security presents a measure of system resistibility to accidental events or intentional activities the consequence of which is the destruction, damage or loosing of valuable resources. In other words, this means an organized *system of protection* from the listed possibilities of damaging the accuracy and security of operations.

The security f computer networks becomes an extremely important issues and one of the prerequisites for operations, especially in the conditions in which the society is increasingly based on the exchange of information and performance of financial and property-related business activities through the network.

Therefore, it is extremely important that the information reaches its destination safely and accurately, so that it could be read only by the authorized persons, with the established and accurate identity of the sender.

This is why the large multinational companies together established a neutral institution – Verisign 1995 – that is to establish and verify the identity of the user and service provider at the global network. The experts of this institution defined a special system of electronic encryption and signing that is used in the exchange of classified and valuable data in the network. The global idea of this system is a double key to the authorization and encryption of the data. Also, the user identity confirmation is performed with the help of a special program that assigns the user with two encryption keys: a public key, that is widely distributed across the network, and a secret one, that the user keeps in a safe place within its server…

However, the issue of computer network protection is much more complex and includes several elements such as:

- Information and data;
- Communication and data processing services;
- User equipment and network infrastructure.

So, it is obvious that, in addition to the concern in relation to data and information, we need to pay attention to the security of other elements of the information infrastructure.

19.1.7. UNIVERSAL SERVICE

Universal services need to covered from other sources and do not belong to the market value category. Therefore, it is necessary to establish a liberalized telecommunication market in accordance with the European model in the shortest period of time possible. Simultaneously with that, we need to create the system for the access and participation of citizens in all areas of the information system.

All citizens need to be enabled to access and participate the information society, which includes the development of the information and communication infrastructure in the entire country, with special attention to the youth, citizens with special needs, the elderly, and the poor.

Free Internet access to all schools, with the aim to provide access to multimedia services in class. Establish the initial solution on the Internet access via telephone or ISDN lines. Apply the universal service obligation, and enable the citizens to access the basic public information: legal and administrative information, the culture, environment and traffic conditions, and gradually, also the electronic access to public services and educational content. Provide the access to information services from the public access points in schools, libraries, and local community centers, which is especially important for the youth and the citizens who do not have other means of access. Realize the electronic access at the public service locations, for those services that can be access via the network.

By the abolition of taxes and with other incentives, influence the prices of computer and communication equipment and software, especially for the educational and private purposes. Stimulate, in accordance with the eEurope initiative, the application of the “design for all” principle for products and services of the information and communication technology. Take into account the citizens with special needs in the procurement of products and services of the information and communication technology. The information and communication infrastructure, and especially eBusiness need to become a major development force that will enable the transition to the information society, increase of the number of jobs, keeping the young experts in the country, and the increase of the competitiveness of companies. Creation of eGovernment needs to ensure the providing of quick and quality service to citizens and companies, and ensure the rational use of

budget funds. The information and communication infrastructure enables new and flexible forms of work, access to cultural and national contents in the digital form, and the availability of health care information and services to citizens and health care professionals.

19.1.8. ASPECTS OF SOVEREIGNITY

Access and participation of citizens in the information society. General service. Development of information and communication infrastructure in underdeveloped areas. The youth and education system as the priorities in the expansion of the ICT. A delay in mastering computer literacy. The young shall bring the ideas of information society to their homes and families, and thus to the entire society in the shortest period of time possible. The role of the school system is to provide satisfactory education in this area to the citizens of all age groups in our country. The information and communication infrastructure represents a tool that can decrease, if not remove the exclusion of citizens with special needs from the society, and increase the quality of their lives. The tools based on standard products, such as personal and integrated computers, can be used in various environments – educational, business, recreational, and in performing everyday activities. A special accent should be made on the realization of independence and self-confidence of citizens with special needs. Although Bosnia and Herzegovina differs from the developed world in this sense, because the elderly, mostly pensioners, possess very limited financial means for the above-mentioned roles, the solutions need to be found in activities that the society can benefit from, which would be organized and supported by the information system of the local communities. Such approaches already exist in the neighboring countries, that we need to compare ourselves with, in terms of the development level.

With a lower price of general services, the citizens with lower income need to be enabled and stimulated to participate in the developing information society. Furthermore, we need to realize the electronic access to the major public services at the location of those services, as the alternative to the “windows”, for those public services that can be accessed via the network. All citizens need to be provided the access and the opportunity to participate in the information society, by developing the information and communication infrastructure in the entire country, with special care for the youth, citizens with special needs, the elderly and the poor.

19.1.9. CITIZENS WITH SPECIAL NEEDS

Citizens with special needs. The elderly. Citizens with low income. The information and communication infrastructure is the most important infrastructure of the modern developed world that strongly influences all the areas of life and labor, transforming them radically and opening up new possibilities for the development of individuals, companies, state management and the entire economy. This infrastructure is the basis of the information society, or the knowledge society, to which the entire developed world nowadays aspires to, and the basis of the information and knowledge based economy. The information and communication infrastructure also enables new forms of labor and easy access to cultural and national contents in the digital form. The application of the information and communication infrastructure in health care is mostly directed at the support to more efficient health care for patients, improvement of the public health care, decrease of the funds and time consumption, and providing services for the professional, scientific, administrative and payment-related, and managerial purposes in the health care system. Swift development of the information and communication technology in the last decade of the twentieth century greatly influenced the economy. This is how Ireland, a country with approximately the same territory and number of population as Bosnia and Herzegovina, with the combination of social partnership, economic measures, attracting direct foreign investments, investing in the information and communication infrastructure

and in the education for the information and communication technology and education with the help of the technology, managed to overcome the economic crisis it was in some ten years ago, and achieve immense progress.

19.1.10. Creation of the Legal and Security Framework for the eBusiness Development

The protection of privacy has to protect the users from the unauthorized use of information on them, and especially from the sale of that information. The data collectors need to be obliged to inform the users on which data they collect on them, and they intend to do with that data, to keep the integrity and quality of information, and enable the users to limit the collection of data on them. The protection of privacy needs to be balanced with the need for free flow of information.

Electronic business operations should compete with the traditional trade on equal basis, so that, for example, electronic business should not be imposed discriminating taxes. It is necessary to develop consistent tax policy at the international level, and avoid double taxation. There should be no customs duty for electronic transactions, just as in case of international telephone calls, faxes or e-mail. The computer crime, and especially abuse of eBusiness, demand that a special law be passed, and also closer cooperation of governments and the business environment. We will also need to solve sensitive issues of taxes and customs duties for the products and services purchased through the Internet, for which even today there is no a generally accepted solution.

It is also necessary to organize a systemic monitoring of indicators in relation to performances of eBusiness, which enables the monitoring of progress in that area, and the comparison with the developed countries. We also need to start setting the examples of best practices in eBusiness, so that they would serve as an example to companies that are only starting to develop eBusiness. For successful development of the information society, it is necessary to develop the legislation in relation to the information and communication technologies, and establish the legal framework for the development of eBusiness that will stimulate its use, and ensure its stability and predictability. In passing the laws and regulation, wherever possible, we need to adopt, or apply the international legislation.

The lack of legislation is evident in the area of eBusiness. The protection of privacy must ensure the users in the events of unauthorized use of information on them and especially in the event of the sale of that information. The data collectors need to be obliged to inform the users on which data they collect on them, and they intend to do with that data, to keep the integrity and quality of information, and enable the users to limit the collection of data on them. The protection of privacy needs to be balanced with the need for free flow of information.

19.1.11. Establishing Human Resources

The governments and the public and private sector have the priority task to ensure the necessary staff within all other economic, technical, organizational and other measures of the creation of the telecommunication and ICT infrastructure. A necessary component for the development of the Internet is the creation of programs that enable education, technical training and the development of qualifications and skills of all participants – the state and public sector, the private sector, in the development of networks and applications and related programs in the development of programs and managerial responsibilities. That is why the following measures are suggested to help create the necessary human resources in this area:

- Demand the creation of the development and training program for the development of the technical and organizational expertise through the establishment of partnerships with universities and other educational institutions,

institutions with plans to establish centers for part-time and high education, training for instructors;

- Sponsors to promote the programs with the aim of assisting companies with debts or by providing assistance in the development of production and services;
- Promotion and joint ventures in the efforts to reach the goal of attracting the private sector to establish the possibilities of training-education for their employees;
- Development of the state and international network of institutions, professors and users to support the planning, organization and implementation of educational and training activities, through full application of the Internet for distance learning, information access, management, promotion and monitoring;
- Organization of activists from different sectors to lead and maintain a constant and directed attention to help in managing and to the training centers through the assistance to trainers;
- Preparation of adequate formal agreements with specific participants, including students, teachers, technical assistants and sponsors. To use such contracts, it can be ensured that the users start performing activities with common expectations. In communities in which people are worried about providing personal information and therefore refuse to participate in training and courses, other methods need to be provided for the setting of goals in accordance with the expectations of its development. In short, there has to be trust among the participants and potential users for maximum participation;
- Preparation of training centers and laboratory equipment, multimedia centers and other ways to ensure easy, secure and accessible operations. Providing training in controlled environment, such as a classroom or a computer lab. The existing possibilities such as libraries and common government or social resources need to be used to common good, for which there needs to be material basis through the synergy with the business subjects interested in the operation of suck centers;
- Support to training needs to be centralized, with a low cost, and the improvement of the quality of training and work efficiency. The training and technical assistance for the design of curricula and dynamic plans for trainers needs to be developed consistently. Still, the training needs to be created in accordance with the specific needs of the community, through active participation of the communities in al segments and levels;
- Configuration of computers to provide technical assistance to ensure adequate security for the equipment, software and data;
- Development of minimum technical standards for computer equipment necessary in the training process. These set standards can cover all the issues related to the equipment, software, and the proper configuration of computers;
- Consider all educational and training programs as a part of the process of permanent education and ensure that the supervision over the learning process and feedback through its implementation at the very beginning of the planning process;
- Clearly define the responsibilities of the staff in relation to training and technical support, which might be difficult: a) for each person, with mixed skills, knowledge and experiences necessary for the training process and distance learning, and b) the instructors will probably have difficulties in focusing and directing their roles if they are responsible for solving various technical problems;

- Providing education and training through projects with set deadlines and resources, the approach of which enables achieving the desired effect;
- Develop the marketing strategy so that people would be informed on possible education and training programs, including the attention of local media.

The significance of education for the needs of eBusiness; directing and monitoring the eBusiness development.

19.2. Factors that Influence the Reaching of the Desired State

To create the environment, it is most important to define the policy created by the legislative and executive authority. The regulatory agency is in charge of the realization of the policy that most directly determines the infrastructure development. The state telecommunication operators are an irreplaceable factor in this process. Considering that the great financial potential renders them independent and fully staffed, they are the agents of the creation and modernization of the communication infrastructure. In addition to these organizations, there are other state subjects that, partly due to their needs, and in part due to the desire to win new business space, invest in the ICT infrastructure. This is why a set of measures needs to be taken to directly or indirectly enable the development of the ICT infrastructure and the informatisation of the society.

19.2.1. Executive and Legislative Authority

Governments and the private and public sectors have the priority task to ensure the necessary staff, within all other economic, technical, organizational and other measure for the establishment of the telecommunication and ICT infrastructure. A necessary component for the development of the Internet is the creation of programs that enable education, technical training and the development of qualifications and skills of all participants, the state and public sector, the private sector for the development of networks and applications and related programs for the development of plans and managerial responsibilities. That is why several measures are suggested to help create the necessary human resources in this area. The importance of education for the purposes of eBusiness and monitoring and directing the development of eBusiness is achieved by defining the policy in the area of telecommunications and the informatisation of the state and society. The basic aim is to create favorable environment for a quicker and quality development. The coordination of activities at the regional and the EU level.

19.2.2. The Regulatory Body

The role of the regulatory body is to implement the set policy through adequate documents, licenses and control functions. The application of standards and recommendations at the state level, except the state standardization organizations, is also ensured through the regulatory bodies. In our country, the Communications Regulatory Agency – CRA is an independent regulatory agency at the state level. It is in charge of the implementation of the Law on Communications and the Policy on the Telecommunications Sector of Bosnia and Herzegovina.

19.2.3. Operators and Providers

The positioned operators are the heirs of the former Postal and Telephone Company monopolies. They are partly or fully privatized, and their owners or co-owners are more powerful foreign operators. In spite of liberalization and competition, they still dominate the market that they possess 80% of. Their power lies in the established user relations, access network and the geographically distributed infrastructure. They are beginning to lose their positions, but they try to hold on to them by using new technologies in the core network, and also the transfer and access network, by offering quick data and Internet services. The positioned operators are burdened with the image of monopolists, then the bureaucracy, the surplus of staff, often outdated technology and slow response time to

market changes. The positioned operators, due to their great market power, represent an irreplaceable factor in the ICT infrastructure development.

The operators are based on the property of organizations the core activities of which are not in the area of telecommunications. The operators that were established on the existing resources appeared after 1995, by capitalizing the existing infrastructure the liberalized telecommunications market. The inherited infrastructure is mostly composed of: the physical distribution network (corridors, channels, ducts, carriers, towers, manholes, locations), optic and electronic infrastructure. The infrastructure was used purposefully to establish the core network that can connect other segments of the positioned operator network. The most common ownership model is the common ownership of trading companies and established operators, where some of them provide the infrastructure, and others capital, the understanding of business operations in the operator segment and the brand. The operators of this group shall continue to advance, because they are not burdened with their inheritance, they are swift and flexible, and, a characteristic especially important for the countries in which the degree of market liberalization is not an especially high one, they do not depend on the positioned operators, since they own their own telecommunication infrastructure. A significant development of the data traffic (FR, IP, ATM), that these operators can take over and offer under more favorable terms, makes this group of operators a stabile and prosperous one. They continue to widen the specter of their services by offering the Internet access and voice services, with which they put their resources to efficient use, and stabilize their financial income. Some operators build their own access networks based on new technologies (optic, radio access), but they also use the traditional copper line and the DSL technologies. Despite that, they must continue insisting on the LLU and the operator pre-selection, because this is the most efficient path to the widest user base.

The cable TV operators of the West, Middle and East Europe are oriented towards the residential users, by offering package-services: distribution of TV channels, the Internet access and phone services. The orientation towards the residential users and the lack of capital does not render them serious competitors to the existing telecom operators that offer the xDSL services. However, since the DSL does not belong to the area of access networks with the expected speed (the estimate is that this situation will last for two more years), the cable TV operators will be some of the major providers of broadband services. In the area of broadband services, the cable TV operators are facing many difficulties. Most of potential users are out of reach of cable networks. Setting up of the infrastructure required considerable investments and time, which is not in their favor; the prices of modems and modem installation have dropped, but the monthly fee for the use of the cable access has increased, so that today it is higher that the ADSL use tariff. Mass implementation will lower the prices of the ADSL so that the current advantage of the cable TV in terms of the service price will soon be gone. In comparison to the telecom operators, the cable TV operators are insufficiently aggressive and financially weaker, and can hardly survive the competition of prices. Despite everything, the number of cable TV users will continue to grow.

Operators of the PLC network are not present in our country at the time. There has been an initiative with the electrical power companies to create a pilot-project of the establishment of a broadband access networks using the electric lines. The regulation or the legal documents do not mention this type of operators explicitly. In this case, there are several problems, both of technological and legal nature, and this type of activities needs to be regulated. As the world assigns great importance to the application of this type of communications, we should by all means have an opinion in accordance with the current world and European standards and recommendations.

Other operators represent a group of operators that do not have their own infrastructure. Those operators are focused at a wide specter of services: telephony, data transfer and

the Internet access, using leased infrastructure. In each case, if they want to survive for a longer time, they either need to establish their own infrastructure, or lease it under favorable terms. If they fail, they will be taken over by larger trade companies.

19.2.4. EDUCATION AND EDUCATIONAL INSTITUTIONS

In accordance to many, education is the key factor of the success of informatisation, and at the same time the development and implementation of the ICT infrastructure. As the educational institutions are the most significant generators of experts, they role is an important one. All forms of education are important and we especially need to mention the new methods, such as short courses, distance learning, etc. in addition to educational institutions, the libraries are equally important for the educational system. Of course, it includes systems re-organized into computer libraries, and information and data bases.

19.2.5. OTHER FACTORS

In addition to the state bodies and organizations, there are a number of other governmental and non-governmental organizations that can influence the development of the information and communication infrastructure. Among others, those are chambers of commerce, educational institutions, institutes, professional associations, etc. also, the electrical power companies and the railroad companies may influence the development of the ICT infrastructure. The private sector, above all the ISPs, also invests into this area, the role of which will become even more important in the future. The above said results in the question of the justified and rational investments, where the state can and should express its interest.

ICT Industry

Development of the Information Society (IS) of Bosnia and Herzegovina demands great investments over a longer period of time. In great investment processes in any area, there is always the question of the participation of local economy and the benefits to the local industry individually. Hiring local resources, legal entities and citizens is of great importance, especially in case of such state of economy and society, as today in BiH: great unemployment rate, slow economic growth, great foreign-trade imbalance, insufficient domestic and foreign investments, insufficient representation of knowledge in the economy, youth leaving the country, poor social standard, etc.

Previous or parallel development of own ICT industry is more efficient and quicker for the IS development, than with completely foreign ICT industry. Thus a mutual relationship is achieved: ICT industry develops the IS, and the IS develops the ICT industry. A logical conclusion is that greater development and growth of the ICT industry provides greater and quicker development of the IS. If there is a resolution to develop the IS as the top priority, the development of the ICT industry automatically becomes a priority. The development of the ICT industry is very significant for the development of knowledge-based society and economy.

The key period of the ICT industry development, defined in accordance with the requirements of the IS development of Bosnia and Herzegovina, is from 2004 till the end of 2007. This period of IS development relates to the "primary" development, which, considering the current status, delays and real needs, means an investment boom in the area of IC technology.

The future development of the ICT industry should be organized, before all, on the maximum use of human resources with specialist knowledge, needs of the BiH market and export to other countries. The goals to be achieved with the development of the ICT industry in BiH are the following:

- Increase of the small and medium enterprises number
- Increase of the employment rate by 5%
- Increase of direct foreign and domestic investments
- ICT clusters development
- e-Production
- Export increase
- Reduction of trade deficit
- Increase of specific knowledge, and
- GDP increase

Measures to stimulate the ICT industry development that must be taken by the government, are common in market economy countries. The suggested measures are mostly aiming the enforcement of the role of private sector, and are prescribing where that enforcement can be done. It does not mean that role of the state as investor and buyer should be reduced. First of all, the state should take over planning of concrete actions that need to be taken by companies in the sense of their production programs, and to create the proper environment for ICT industry development. However, the state cannot be completely excluded from economy, and we do not emphasize such strategy. The measures suggested in this document emphasize the creation of favorable business environment, through active and focused role of the state, that the investors shall recognize and decide for entrepreneurship in the area of ICT industry of BiH.

The system of statistical monitoring in Bosnia and Herzegovina is being developed and does not provide for collection of relevant data/indicators on the ICT industry and development of the ICT industry in Bosnia and Herzegovina. That represents a serious obstacle to planning and monitoring the development of the ICT industry. In that sense, it is necessary to begin with the process of creating the instruments of statistical monitoring of the ICT industry development in Bosnia and Herzegovina, i.e. collection the real data on the development of this industry in Bosnia and Herzegovina.

20. INTRODUCTION

20.1. ICT INDUSTRY IN THE CONTEXT OF IS DEVELOPMENT

Strategy of the ICT industry development in Bosnia and Herzegovina is an integral part of the "Strategy of Development of the Information Society (IS) of Bosnia and Herzegovina" document, and represents a basic mechanism of implementation and achieving the planned and desired development of the IS in Bosnia and Herzegovina. According to the experiences from many countries, it is much more efficient and quicker to develop the information society with previous or parallel development of own ICT industry, as a separate production line of the total economy of a country, than to ground the development of IS completely on ICT industry of other countries. There are several benefits of this approach, in the social and economic sense. The society will have its own development and research, which provides the base of permanent development and advancement of the society and economy in future. Without the development of the ICT industry, the society would be destined to permanent dependence and hindrance of development. ICT industry provides dynamics, guidelines, and synchronization of social activities in the development of the IS Development Strategy and total economy, because the ICT, as a basic mechanism, enters all the cells of the society and economy, and becomes the main foundation of development, through connectiing the people, markets, societies, religions etc.

Despite the last indicators of the recession of global economy, the ICT industry of the world is still developing and spreading, and remains one of the drivers of the economic growth. The reason behind that lies in the fact that the ICT is not limited to several developed countries; instead, it represents global interest and the interests of all in particular. In several previous years, only the ICT industry has been recognized as the source of all economic and social change.

Governments of almost all countries in the world are trying to design or have designed effective policies to facilitate the use of ICT with the aim of stimulating the economic growth. Sudden changes in the ICT industry, from the "wealth" to later crash of ".com" companies caused the need for more reliable and modern indicators, so that the policy designers could be able to verify the Digital Divide of their countries and compare them to other countries.

20.2. ICT INDUSTRY IN BIH

The development of the ICT industry in BIH needs to be designed and dimensioned realistically, in relation to the possibilities and needs of the domestic and foreign markets. The government policy and development measure of the ICT industry will be directed towards the regulation of activities and success of the industry, and not of individual companies.

The concept of *industry*, in general, was introduced so that companies could form groups in accordance to their connections and interdependence, and to easily construe the rules on the basis of which the actions and behavior of competitive members of an industry could be predicted. Segmentation of the companies into industries enables monitoring, research and prediction of aggregate data such as: total production, total employment, cost, investments, etc. All the information is then grouped in accordance to standard industry classification.

For that reason, it is necessary to clearly define the "contents" of an industry in the economy. The definition of the "contents" of the ICT industry in the economy of Bosnia and Herzegovina is the topic of the following chapter.

Fast development and spread of the ICT industry in the world caused the development of new professions that were not present in the existing classifications. Therefore, the assessment of the activities and growth of the ICT industry, in accordance to industry classification of that time, did not represent this industry accordingly. For that reason, in mid 90's, the intensive work began on defining the industry standards for the assessment of the activities and growth of the ICT at the international and national level. International organizations, together with

national statistics agencies, worked on the development of common definitions, common methods and common assessments of the ICT industry. The most recent international standards do not provide for complete assessment of the ICT industry, and are intensively being perfected and used as the basis of more detailed defining of the national standards (industries). The countries with a leader status in the ICT industry are at the same time member of the Organization of Economic Cooperation and Development (OECD).

The achievements and experiences of other countries will be useful for countries that are now commencing with the development of the national industry standards, in order to assess the results of the ICT industry.

At this time of initial stage of defining the ICT industry in Bosnia and Herzegovina, it is extremely rational to use the OCED definition of the ICT industry, as the basis of work on defining the ICT in BIH, by using, at the same time, the experience of developed countries, members of the OECD.

21. DEFINITION OF THE ICT INDUSTRY

21.1. OECD DEFINITION OF THE ICT INDUSTRY

OECD countries defined the ICT industry as a group of production and service activities directed at: collecting, transfer and display of information in the electronic form. In designing this definition, the following principles served as guidelines:

a) production

- the product must be designed to serve the function of data processing and communication, including the transfer and display of information, and
- the product must use the electronic processing to detect, measure and/or record the physical phenomenon or control a physical process.

b) services

- activities that fulfil the function of data processing and communication in the electronic sense.

In 1998, Member countries achieved an agreement on business activities that compose the ict industry, by using the International Standard of Activities Classification (ISAC Rev. 3).

21.2. DEFINITION OF ICT INDUSTRY OF BIH

Considering the total economic environment and preparation conditions, the definition of the ICT industry of Bosnia and Herzegovina should be precise and concentrated on only those areas that realistically provide for the possibility of economic growth and market competitiveness. This definition present the "contents" of the future field of work on the ICT industry strategy, i.e. the "Strategy of Development of the Information Society (IS) of Bosnia and Herzegovina" document and its implementation.

The basis of defining the ICT industry is the table and code book of NACE business activities, that were used in the systematization of areas of activity for this industry.

In order to achieve precision and close familiarity of the areas, or homogeneous character of the industry, a minimum of four digits with the precise name of the area were used, to more easily monitor and assess the effects of support and development.

The areas of ICT industry in Bosnia and Herzegovina are given in the following section:

DL/30.02	Production of computers and other data processing equipment
DL/31.30	Production of insulated wire and cables
DL/32.10	Production of electronic tubes and other electronic components
DL/32.20	Production of TV and radio transmitters and wire phone and telegraph equipment
DL/32.30	Production of TV sets, radios, sound and image recording and reproduction machines, and similar equipment
DL/33.20	Production of instruments and machines for measuring, control, testing, operating and other uses, except industrial process control equipment
DL/33.30	Production of industrial process control equipment
G/51.43	Wholesale of electric household appliances, radios and TV sets
G/51.64	Wholesale of office machines and equipment
G/52.45	Retail sale of electric household appliances, radios and TV sets
G/52.48.1	Retail sale of office machines and equipment
G/52.72	Repair of electric household appliances, including radio and TV equipment and other audio and video equipment
I/64.20	Telecommunications
K/71.33	Renting office machines and equipment, including computers

K/72.10	Consulting on computer hardware
K/72.20	Consulting and software supply
K/72.30	Data Processing
K/72.40	Data base construction and management
K/72.50	Maintenance and repair of office and accounting machines and computer systems
K/72.60	Other related computer activities

Nomenclature marked as DL/30.02 through K/72.60 shall be referred to hereinafter as NACE/IKT/BA.

22. THE CURRENT STATE OF ICT INDUSTRY

22.1. THE STATE OF ICT INDUSTRY IN THE WORLD

There is a lot of material with indicators of the state of ICT industry in the world or a certain region. A great portion of it is publicly available. We have decided to use the OECD "Measuring the Information Economy 2002"[18] document to present the state of the ICT industry in the world, considering the structure of Member countries of the OECD, and having in mind the development of their ICT industries. We have chosen only several indicators of the state of ICT industry from this document.

ICT Production

National statistics of the OECD Member countries on the value of production, in accordance with the OECD definition of the ICT industry, show that the ICT industry, in 2000, participated with 4% - 15% in total production of products and services, not taking the agriculture into account.

Size and Growth of ICT Industry

In 1990's, the importance of ICT industry increased in the economies of the OECD Member countries. Significant growth was recorded especially in the counties in the northern part of Europe. Still, ICT industry of Member countries represent a relatively small portion of OECD GDP, that amounts to 5% - 16,5%, while the OECD average is 9,7%.

ICT services, such as telecommunication and computing services make up between 70% and 90% of total ICT industry. Simultaneously, an increase in the share of computer and related, mostly software services is discernible.

Contribution of ICT Industry to Employment Rates Increase

The employment rate increase in the ICT industry in the period of 1995 – 2000 was recorded in all OECD Member countries, except Austria. The OECD average annual increase rate in this period is 6,3%. The most dynamic component is the increase of employment rate in software services, with the OECD average of 11% annually.

Research and Development in ICT Industry

In 1990's, a greater increase of investments into research and development in the ICT services (circa 14%) was recorded, than the investments into research and development of ICT products (circa 6%).

Structure and Share of ICT Industry in Total Exports

In comparison to other industries, the ICT industry is highly global. The share of office equipment and computers has dropped from 39% in 1990, to 31% in 2000, while the share of radio, TV and communication equipment increased from 44% in 1990, to almost 56% in 2000.

More details on the state of ICT industry in the world are available in Appendix 3.

22.2. THE STATE OF ICT INDUSTRY IN BOSNIA AND HERZEGOVINA

According to reports of several institutions and organizations, the situation in Bosnia and Herzegovina in 2003 was not dramatically different from the situation on 2002. That enables the indicators available for 2002 to be considered appropriate for the assessment of the current state in Bosnia and Herzegovina. Having in mind availability and reliability of indicators related to the ICT industry of Bosnia and Herzegovina, and the need to prepare quality recommendations and requirements of the ICT industry development in Bosnia and Herzegovina, the current state has been assessed in accordance with the following segments:

- State of production and services in the ICT industry in Bosnia and Herzegovina,

[18] www.oecd.org/sti/measuring-infoeconomy

- Approach and use of the ICT in Bosnia and Herzegovina (through which the communication infrastructure was treated),
- International competitive ability of Bosnia and Herzegovina in domains relevant to the ICT industry,
- Advantages and disadvantages of the current state.

22.2.1. STATE OF PRODUCTION AND SERVICES IN THE ICT INDUSTRY IN BOSNIA AND HERZEGOVINA

It is difficult to tell which is more important today, and which is less available in Bosnia and Herzegovina: modern, market oriented economy or efficient state, or both. Our reality is this: factories without real production, taken out from their natural production environments and driven away even from those markets in which they used to be affirmed, state government without managerial resources and available updated and accurate data, public and utility companies and service providers with no resources to prepare for the renewal of dilapidated infrastructure. Of course, our main problem is the chronic lack of money, and the fact that we can hardly achieve progress without considerable financial injections from abroad and extra efforts in domestic financial market.

That is why precise, feasible and sustainable projects and modern and competitive programs must be prepared. The state and the economy will become the masters of their resources only after receiving precise and updated information, so that they could express their needs in a competent manner and make realistic development plans.

Computer science with modern micro-processing technology is not a work intensive, but a technology intensive discipline, and it must join the sphere of small production, and great efforts on research and development. Out initial capital represents extremely strong research basis, the personnel who can apply modern technology, the technology of high element integration.

The production of computers and computer equipment is a highly complex and complicated process. Our companies are not able to adequately respond to such challenge. Only one company in BiH is able to produce a multi-layer integrated board. For that reason, it is necessary to establish cooperation with a large number of co-producers, so that components come together in places of integration of elements in a system the configuration of which is determined in accordance with the needs of buyers. This kind of production corresponds to this branch of technology.

Current production in Bosnia and Herzegovina is mostly related to the work of local work force in accordance with a foreign license.

Achieving new products requires the existence of knowledge, courage and labor that lead to strengthening of our abilities and belief that “we can do it”. As opposed to that, production in accordance with a foreign license stifles creativity, extinguishes the belief in own forces and leads to technological apathy and dependence on foreign countries.

In Bosnia and Herzegovina, the problem of placement of computers and computer equipment is connected with unforeseeable behavior of BIH market, meddling of politics into market relations, because of which the domestic product loses the chance against the foreign product or against a product that is domestic only because of the label on it.

It is very typical of transition countries that people who decide on investments into information systems and ICT industry suffer from chronic, irreconcilable extremes in deciding. Due to the lack of real information and valid analysis, the needs are usually augmented and mystified.

Market and export orientation and company development programs resulting from them, demand quick and precise supply and efficient responses to market demands. If we want to return to international markets and conquer the local market, it is crucial to radically cut the time of the offering period and the standard cycle of product development, form the

concept sketch, through construction, analysis and optimization, preparing documentation, to preparations for production.

Bosnia and Herzegovina can use its handicap of falling behind in computerization by working on top-notch and latest technology. Some countries in the world cannot afford to make a clean cut and say goodbye to old technology, and are forced to make additional efforts maintaining the existing systems. That is an opportunity to establish sound production and outdo other countries and offer them a finished product. That practically means that the earlier or existing disadvantage can be turned into an advantage.

Today, there are over 250 companies existing in Bosnia and Herzegovina that deal with the production of IC equipment and services, which sufficiently illustrates that we can count on quick and efficient development of the ICT industry.

State of production and services of the ICT industry in BIH:

No.	Business Activity	Number of Companies
1	Production of computers and other data processing equipment - DL/30.02	More than 50
2	Production of insulated wire and cables - DL/31.30	4
3	Production of electronic tubes and other electronic components - DL/32.10	6
4	Production of TV and radio transmitters and wire phone and telegraph equipment - DL/32.20	14
5	Production of TV sets, radios, and similar equipment - DL/32.30	4
6	Production of industrial process control equipment - DL/33.30	5
7	Telecommunications - G/52.72	More than 25
8	Renting office equipment, machines and computers – K/71.33	4
9	Consulting on computer equipment – K/72.10	More than 25
10	Data processing – K/72.30	More than 20
11	Data base construction and maintenance – K/72.40	More than 20
12	Other related computer activities – K/72.60	More than 20

The following operators and service providers perform their activities in Bosnia and Herzegovina:

Telecom operators of fixed phone network:	BIH – TELECOM (more than 500.000 clients)
	TELEKOM SRPSKE (more than 300.000 clients)
	HT – MOSTAR (more than 130.000 clients)
Telecom operators of mobile phone network:	BIH – TELECOM (more than 500.000 clients – pre- & postpaid)
	TELEKOM SRPSKE (more than 300.000 clients – pre- & postpaid)
	ERONET (no license) (more than 140.000 clients – pre- & postpaid)
ISP	40 licensed companies (more than 40.000 users)
Network operators:	58 licensed companies
TV stations:	35 licensed companies (more than 1.700.000 users)
Radio stations:	93 licensed companies
Cable TV operators:	8 licensed companies (more than 50.000 users)

22.2.2. APPROACH TO AND USE OF ICT IN BIH

There have been significant changes in the ICT infrastructure in past years. The quality of the infrastructure has been improved, and the number and volume of communication services has been increased.

In the area of fixed telephone services, the degree of transfer system digitalization is 100%, the degree of commutation system digitalization has been increased to 80%, the construction of highway networks on the level of Bosnia and Herzegovina is in progress, the fixed telephone services providers have been licensed at state, entity and local level.

The degree of penetration is a bit over 30%, which places BIH in the middle group of countries, but BIH is still lagging behind other countries in the region.

In the field of mobile telephone services, new services related to W@P, MMS and GPRS have been introduced, the mobile phone operators have been licensed at the state level *the licensing of the third operator is in progress). The penetration rate is about 30%, which places BIH at the very top of middle group of countries. BIH is still lagging behind other countries in the region in the field of mobile phone services.

Even though the penetration of Internet users has almost been doubled, it is still so small (4-5%), that it places BIH in the bottom group of countries. The PC is still the main mean of accessing and use of Internet services.

The penetration of PCs is circa 6% in households. Of course, penetration rate is higher in economy, than in households but it is usual trend in developing countries.

According to many indicators, the number of Internet hosts and computers in BIH has increased, but it has also increased in other countries, so, on the basis of available indicators for the previous three years, we can state that the comparative position of BIH has not changed significantly.

It is discernible that the distribution of PCs in education is uneven, where there are: 28% in primary education, 26% in secondary education and 46% at universities. Only 65% of high schools have access to Internet. The status of university education is somewhat better, since 91% of faculties have Internet access.

Only 78% of government offices have access to the Internet, with only 20% of offices with permanent access.

The TC sector dominates the ICT industry in Bosnia and Herzegovina. Profit from TC services, as in most poorly developed countries, significantly dominates the total income made in the ICT industry. The share of the existing three telecom operators in GDP of BIH is 8,5%.

The worst current state in the ICT industry today is the research and development programs. We can freely say that there are no research and development programs in the ICT industry.

22.2.3. INTERNATIONAL COMPETITIVE ABILITY OF BIH IN THE AREA OF THE ICT INDUSTRY

The Science and Arts Academy of Bosnia and Herzegovina (ANU) and the MIT Center of the Faculty of Economy in Sarajevo prepared and published a Report on Competitiveness of Bosnia and Herzegovina for 2002. The Report analyzed the competitive advantages and disadvantages of Bosnia and Herzegovina through the analysis of 10 internationally recognized factors, with groups of total of 184 criteria that determine the competitive ability of a country in accordance with the methodology of the World Economic Forum (WEF). All the criteria are not equally relevant to individual sectors or industries. The data from the Report on Competitiveness of Bosnia and Herzegovina were used in the analysis of the current state of the ICT industry in BIH.

The following text provides the factors that are most relevant to the ICT industry in BIH.

Human Resources. The following personnel is relevant to the ICT industry: electrical engineers from all departments, especially informatics specialists, those with M.A.s, PhDs, informatics engineers, application programmers, system engineers – administrators, repairmen, economists of informatics direction, managers, etc.

BIH belongs to the middle group of countries in relation to availability of education in mathematics and science in schools, and availability of scientists and engineers of traffic, communications and financial mediation. On the other hand, BIH is at the very bottom with regard to a high unemployment rate and scientists and engineers who are leaving BIH.

It is a positive circumstance that the education of electric engineers in BIH, at departments of informatics, telecommunications and electronics, was intense prior to 1992 (only at the Faculty of Electrical Engineering in Sarajevo - FEE, the total number of 1922 students graduated in the period since its founding in 1961, until April 30 1992, at Departments of Informatics, Telecommunication, and Automatics and Electronics). After 1995, the trend did not reach the status from before the war (in the period of 1 January 1996 - 31 December 2003, the total number of 405 students graduated at Departments of Informatics, Telecommunication, and Automatics and Electronics, at FEE Sarajevo), but establishment of new department for Management Information Systems at the Faculty of Economics in Sarajevo and Informatics studies in Mostar certainly show improvement regarding the development of needed human resources foundation.

Highly qualified IT staff find good, well-paid jobs in BIH in the areas of: electrical power supply and mining, financial mediation, construction and processing, somewhat less well-paid jobs in the area of wholesale and retail trade, communications and traffic, agriculture, game and forestry, and worst-paid jobs in the area of real-estate and catering.

Knowledge resource and skills improvement. In the knowledge resource, it is necessary to perceive the crucial difference between the general knowledge acquired in the education system and specialist knowledge acquired in companies with permanent training with the aim of sub-specialization.

Companies' investments in the development of the IT skills with their employees put BIH in the middle group of countries, but that is still insufficient considering the current state in the ICT industry in BIH. The most investments go to the area of financial mediation, then to the areas of electrical power supply, wholesale and retail trade, and least to areas of catering, communications and traffic, processing, construction, game and forestry and mining.

Small and large enterprises invest more than middle companies.

In BIH, training and education programs in the area of IT lag behind most countries. In the area of financial mediation, IT training and education programs began the trend of reaching the best standards in the world. Programs in the area of electrical power supply, communications and traffic, real-estate and processing are on a lower level. The lowest level is occupied by the programs in the areas of agriculture, game and forestry, catering, construction and wholesale and retail trade.

Capital resources (Financial System). The most important institutions in the area of financial system of BIH are the Central Bank, as an issuer that functions on the principles of the Currency Board Arrangement, and commercial banks of the universal type.

The capital market of Bosnia and Herzegovina functions at the level of two entities, which presents a great handicap for such a small market, like BIH. all the regulation and institutions of this market are placed at the entity level. The trend of changes in this market and the number of professionals included show constant growth. Two Stock Exchanges, Banja Luka and Sarajevo, have been operating more than two years. We can

say that the capital market is developing, but it is necessary to regulate it at the stet level, so that the market could be organized at the level of the entire BIH. on the other hand, that enables linking with other capital markets in the region.

The foreign currency market of BIH is also undeveloped and functions only through the Central Bank, that, on the basis of the collected foreign currency funds, issues the Convertible Mark as a domestic mean of payment. Such market is insufficient for the state economy.

BIH belongs to the very bottom in case of sophistication of the financial markets, the possibility of providing external sources of investment funding, possibility of receiving credit with good business, without the collateral and possibility to provide finance for innovative, but risky projects. On the other hand, the entrance of foreign banks to local banking business and the influence of the financial market on the interest rate levels place BIH in the upper group of countries.

Local market competition. Local competition, as an element of the business environment, has a direct influence over the creation of competitive abilities of domestic companies. The influence of the domestic competition must be such that it directs the companies towards the increase of the market competitiveness, and not the protection from the competition.

BIH is at the very bottom in case of the anti-monopolistic policy, regulatory standards, easiness of staring new businesses, sources of local competition, the numbers and quality of local providers, existence of clusters and sophistication of buyers in the country. On the other hand, BIH is at the very top relative to the possibility of introducing new competition to the local market.

The situation is also unfavorable in case of the competition factor at the local electronic trade market. The factors show that the method of work of the electronic trading companies in the country is almost solely local.

The situation is somewhat more favorable in case of the factor of software products sold in the country that shows that these products in their original concepts are largely compatible with local needs. The B/H software companies are also very much oriented to markets of neighboring countries.

The information hardware production factor shows that this type of production has just started, and that it lags behind the most developed world economies.

The factors that relate to the volume of local software and number of companies that offer software services, and compete in the local markets, point out the competitiveness of local markets and relatively high participation of domestic software.

Business activities and company strategies. The crucial prerequisite for successful business of a company is quality top management and a clear business and strategic direction of the company. BIH has a very limited number of quality top managers, and with that a very small number of successful companies, mostly due to the absence of the society value system that would highly value the top managerial jobs, to the complete lack of quality education centers for the education of top managers, and due to insufficient encouragement for top managers to improve their knowledge and skills.

BIH is almost at the very bottom with regard to all the issues in this area, and some of them are: competitive abilities of local companies in the international markets, procurement of new technologies, production processes in the country, customer orientation, marketing development level, fees for the work done, competency of major managers and management schools in the country.

22.2.4. ADVANTAGES AND DISADVANTAGES OF THE CURRENT STATE

These conclusions and recommendations, except the stated factors of the competitiveness of BIH, take into consideration the analysis of the ICT forum that was held in May 2003.

Indicators of the state of the ICT industry in BIH and estimate of the competitive ability of BIH provide the image of great development variability of the conditions for the ICT industry development, which can only be understood as a consequence of unorganized approach to this area. We can also perceive how essential the development of the ICT industry is, considering the needs of BIH, and the fact that the basic prerequisites are either in a good state or follow the trend of development.

In addition to the stated advantages, one also needs to perceive the disadvantages in a realistic way. It can be expected that the size of the BIH market will influence the ICT industry to accept the approach oriented towards exports, from the very beginning. Also, it is easier to realize certain activities from the very beginning, than to correct them under the pressure of existing bad practices.

World leaders in the ICT industry have their own disadvantages, and succeeded in achieving the leader positions only by constant efforts to overcome the obstacles and minimize their influence on the development of the ICT industry.

For example Norway, which was occupied the 20th position in accordance to the assessment of the competitive abilities, has some disadvantages relevant to the ICT industry, such as limited domestic market, concentration of population in the cities of the South, ICT industry dominated by the telecommunication sector, high living expenses, poor participation of e-commerce, low degree of penetration of broadband access to ICT, outsourcing from countries such as India, China and Russia, poor results of the telecommunication sector competition and incomplete ICT regulation.

Ireland, which is often quoted as the textbook example of success, and which occupied the 22nd position in accordance with the assessment of the competitive abilities, has its obstacles to the development of the ICT industry, such as geographic location, dependence on foreign investments, concentration of population in cities and migration to Dublin, bad traffic infrastructure, insufficient training of working citizens and poor telecommunication infrastructure (lowest penetration rate in EU), and poor indicators of Internet use.

Even with the average of unsatisfactory indicators of the current state of the ICT industry in BIH, none of obstacles related to the ICT industry present a long-term threat to its development. Also, most of the indicators representing obstacles basically make it possible to begin with successful implementation of the strategy of ICT industry development in BIH. The additional support and framework to successful implementation of the strategy is provided by the prepared document titled “Policy for Development of Information Society in Bosnia and Herzegovina”.

The current state of the ICT industry and great need for ICT products and services in BIH provide a great opportunity for support the development of the ICT industry in BIH, by the removal of obstacles and introduction of incentives, and by relying on domestic ICT products and services.

22.3. STATE OF THE ENVIRONMENT FOR THE NEEDS OF ICT INDUSTRY

22.3.1. LEGISLATION AND REGULATION

With this document, the ICT industry becomes a "new" line in the economy of Bosnia and Herzegovina, to the subjects of which all general legislation and regulation apply, just as to other business persons, from other industries of the BIH economy. This, in truth, is not

an entirely new industry, considering a large number of legal persons that make up the industry, that have existed and worked for a large number of years, organized on somewhat different basis an with different goals.

The problem of legislation an regulation improvement for the economy of BIH has been analyzed and defined in the Development Strategy of Bosnia and Herzegovina (PRSP) which relates to the period of 2003 to 2007, which coincides with the time of the initial and most important activities in the development of the ICT industry defined in this Strategy. Generally speaking, the PRSP approach completely incorporates the ICT industry and its general needs. However, the analysis of the planned state regulation measures (Subtitle 5.1. hereof) indicates the need to adopt, modify and harmonize individual acts and regulations, with the aim to realize the planned measure that should stimulate the development of the ICT industry in BIH. that is especially true of the legislation and regulation related to: customs, taxes, finance, local and international trade, e-Business, etc. By realizing these activities related to the legislation and regulation, a better and crucial environment for the needs of the ICT industry would be achieved.

22.3.2. INSTITUTIONS AND ASSOCIATIONS

The development of the ICT industry is related to the work of authorities and association related to this business area. The most relevant institutions, on the work of which the development of this industry directly depends are: authorized Ministries of Economy and Trade, ministries and institutions for education and scientific and research activities, ministries of communications and transport, institutes for statistics and standardization, chambers of commerce, associations of the ICT industry, etc.

The engagement of each of the authorities and associations is laid out in the Action Plan and Projects, with clear responsibilities and tasks resulting from this Strategy.

The appointment of carriers of individual activities and dynamics of realization is targeted at synchronized actions and implementation of this Strategy, in order to achieve timely and complete realization of the defined vision and goals of the development of the ICT industry in Bosnia and Herzegovina.

22.4. ICT STANDARDS IN BIH (BAS STANDARDS)

22.4.1. GENERAL INFORMATION ON ICT STANDARDS

Information and communication technologies were created mostly in developed industrial societies, and now play an increasingly important role in the assistance to transition and developing economies in using their potential. The challenge is to know the best way to use the tools of the information society to achieve the development goals in global dimensions and to put their advantages to best use, by decreasing barriers to the least possible amount.

The international standards are agreements on best practices that are exchanged and accepted at the global level. They are the result of the process that includes six principles defined by the WTO – they are open, clear, unbiased, and based on consensus, efficient, adequate and reasonable, and have the development dimension.

The development dimension is material to overcome the digital divide between the "possessing" and "not possessing" the information and communication technologies and information. The possible benefits of international standards for transition and developing economies include much better possibilities of development of local industries and internal markets. They provide the means for cutting expenses, widening of choice of partners and providers, creating products that cover the world market and are accepted at the world market, and for the increase of export possibilities by reducing technical barriers to trading.

The international standards created by the International Electric Engineering Commission, International Standardization Organization and the International Telecommunication Union are necessary for the use of information and telecommunication technologies in the developing countries. Today, these three organizations cooperate even more closely in the entire ICT specter.

22.4.2. BAS STANDARDS

Today, the basis for the work on standardization in Bosnia and Herzegovina is comprised of the Law on the Establishment of the Institute for Standards, Measurements and Intellectual Property of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 19/01), and the Law on Standardization of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", NO. 19/01).

The institute is authorized for the establishment of the standardization system of Bosnia and Herzegovina, representation and presentation of BIH in international and other inter-state organizations for standardization, and performance of activities that relate to international agreements and membership in such organizations.

The basis for drafting of the BIH standards are international (ISO, IEC), European (EN), and in special cases, other standards.

BAS standards are the result of joint efforts of experts gathered in technical committees, who work in accordance with current principles of standardization, rules of practice and directions of the Institute.

The technical committees relevant to the ICT industry are:

- TC 1 Information technology
- TC 5 Telecommunications

And other committees which prepare standards that are used also in the ICT industry:

- TC 15 Electromagnetic compatibility
- TC 19 Electric installations in buildings
- TC 30 Electric cables
- TC 18 Energy transformers, measurement relays and protection equipment
- TC 10 Equipment for the measuring of electrical energy use and damage control
- TC 3 Quality management and quality guarantee
- TC 7 Environment

Published standards are available to all interested persons for use and application. BAS standards are not mandatory, and their mandatory application may be triggered by contract obligations or other basis.

The application of BAS standards and other documents of recognized rules of practice is carried out with personal responsibility.

TC 1 and TC 5 technical committees are among the most active of committees of the Institute. Published BAS standards are relevant to the ICT industry, they simplify the use of existing and new technologies, reduce costs and complexity, open markets and facilitate the access to products and services.

23. DESIRED STATE OF THE ICT INDUSTRY DEVELOPMENT IN BIH

23.1. NATIONAL AND REGIONAL CONTEXT

Information and communication technologies (ICT) are a powerful instrument for positive social and economic changes in today's world and time. Unfortunately, though, they are not equally distributed, either in development and production, or in application, in areas such as administration, education, health care, etc.

The development and application of the ICT significantly varies among countries and in them, between urban and rural areas, between the rich and the poor, the educated and the uneducated, and between women and men.

In cases of advanced approach to the ICT, i.e. with intensive entrance to the Information Society, the ICT industry is developed simultaneously with the development of application. ICT technologies enable the growth of the number of small companies and grouping of entrepreneurs in less developed, and distant areas, and their connecting into state and regional, and even global markets. Often it is those small, and of course middle companies that deal with production in the very area of the ICT technologies. The ICT industry greatly speeds up the process of the Information Society development.

Planned development of the ICT industry in BIH and its connections on the regional level can influence both the improvement of social and economic circumstances in the country and the region, and also on their approach to Europe, with the decrease and eventual overcoming of the so-called digital divide between European and Balkans Countries.

23.2. CURRENT INITIATIVES IN THE AREA

In order to overcome the existing digital divides among the countries of the South East Europe (SEE), many initiatives have been put in action, on the basis of the e-Europe, e-EU-Action Plan, e-Europe 2005, and e-Europe+ Documents.

Before all, we need to mention the eSEEurope Document, adopted by the Stability Pact of the region, in Tirana, in May 2001, that, among other, supports the promotion of the proposal for Pilot Projects that correspond to the e-Europe Program. These are projects such as:

- Creation of ICT environment that enables incentives to economic growth,
- Support to small and medium enterprises for the application of the ICT.

A special value of the eSEE Initiative is in the acceleration of the ICT development in the region.

Another document that deserves attention and is significant in the context of the subject of this Strategy is the eSEE eAgenda (adopted in Belgrade on October 29, 2003), that developed during sessions of the eSEEurope Initiative, and contains the most important elements of the eEurope+ Initiative and eEurope Action Plan, adapted to the actual state of the West Balkans countries. This document, among other, regulates the issue of establishing a Government Body (of course, one for each country), an agency, or a similar authority that would be responsible for the implementation of the state policy, strategy and regulation in this area.

In the meantime, during the period January 2002 - June 2003, the ICT Forum of BIH was held, at which there was special discussion on the ICT industry, and it was decided that the ICT industry would be the first for which, as an industry sector, a Development Strategy would be prepared.

23.3. ICT INDUSTRY DEVELOPMENT VISION

The development of the information society of BIH requires great investments over a long period of time. That is especially true in case of the period until 2010, as planned in the Information Society Development Strategy. In case of great investments in any area, there is always the question of representation of local economy, and the benefit for local industry

individually. Will the new investment cause social and economic growth or not? So, except aimed investment results, the engagement of the local resources, businesses and citizens is extremely important, especially in case of a such state of the economy and society, as is with Bosnia and Herzegovina: great unemployment rate, slow economic growth, great trade imbalance, insufficient local and foreign investments, insufficient presence of knowledge in the economy, youth leaving the country, low social standard, etc.

Previous or parallel development of own ICT industry is more efficient and quicker for the development of the information society, than with completely foreign ICT industry. The relation goes two ways: the ICT industry develops the IS, and the IS develops the ICT industry.

The benefits of this kind of approach are multiple, in the social and economic sense. The society will possess its own research and development, which provides prerequisites for permanent growth and advancement of the society and economy in future. Without the development of the ICT industry, the society would be condemned to permanent dependence and hindered development. The ICT industry provides dynamics, direction and synchronization of social activities in the implementation of the IS Development Strategy and total economy.

A logical conclusion is that a greater development and growth of the ICT industry provides greater and faster development of the IS. If there is a resolution for the priority development of the IS, the development of the ICT industry automatically becomes a priority.

What can be developed in BIH in the area of the ICT industry, and to which degree?

The vision of the ICT industry development must, basically, be realistic and coordinated with needs and possibilities of BIH, considering the extreme development of these industries in other economies that developed in accordance with the market (local and international).

The key years of the ICT industry development, defined in accordance with the requirements of the BIH IS development, are from 2004 until the end of 2007. This period of the IS development relates to the “primary” development, which, considering the current state and real needs, includes an investment boom in the area of information and communication technologies. This is a clear sign that in the beginning of this period, all the preconditions need to be used, and all planned stimulating measures need to be provided in implementation.

The planned stimulating measures and increased engagement of the private and public sector enable great changes in this industry. Organized and synchronized approach to the development of the IS and ICT industry can provide sound directives and benefit to the realization of a realistic vision of the ICT industry development.

The ICT industry, before all, needs to increase the quality, number and variety of offered domestic products and services for the IS development. This can be realized through new foreign investments and connections of our companies with developed world companies. A great chance for that is available in technology parks and incubators, that need to stimulate new entrepreneurs.

The development of the ICT industry in future needs to be developed, above all, on maximum use of human potential with specialist knowledge, needs of BIH markets and exports to other countries.

The ICT industry of BIH in the next period will reach the following development (developed possibilities):

- Ability of domestic companies (public and private ones) to participate in the assembly, installing and maintenance of hardware to the maximum;
- Ability of local companies to participate in the production and delivery of software for domestic needs to the maximum;
- Ability of domestic companies to participate in the production and delivery of hardware and software for the needs of exports, to the maximum;

- Maximum use of local consultants for the development of the IS,
- Maximum use of local independent experts, faculties, schools, academies and other for specialist education, use and operation of the ICT.

Reaching the vision of the ICT industry development will enable the fulfilling of concrete goals provided in the following text.

23.4. GOALS OF THE ICT INDUSTRY DEVELOPMENT

The goals of the ICT industry development in Bosnia and Herzegovina are related to necessary investments in the area of the ICT, or the development of the information society of Bosnia and Herzegovina. Great drawbacks in the information society development in comparison to other developed countries, and further, permanent development of other countries, make the need for investments in BIH even greater. That means that the need for the development of this industry is greater, for ourselves, and that the chances and conditions for the development of the ICT greater.

The goals that need to be achieved through the development of the ICT industry in BIH are the following:

- Increase of the GDP,
- Exports increase,
- Increase of the number of small and medium companies,
- Increase of the employment rate by 5%,
- Increase of direct domestic and foreign investments,
- e-production,
- development of the ICT clusters, and
- increase of the specific knowledge.

23.5. NEW STATE SEGMENTS

Enormous technological breakthrough in the ICT industry opened a whole new world – the world of services. In several years only, most users got the access to a whole range of communication services, while the Internet and mobile telephony reached the dominating role. The changes are quite clear: there has been progress from production oriented to service oriented economy.

In production oriented economy, the price structure is relatively simple, there are almost no variations in prices, and the relations between the buyer and the provider are direct. In the world of services, the price structure is much more complex, services are combined, tariffs adjusted to the user, and there are many intermediaries between service providers and the ultimate user. The increased permeability rate and advances user interfaces for the access to the content create possibilities for a wide range of new, innovative products and services, which causes the creation of a chain of values of the ICT industry, with changes to the distribution chain of total income, with the following current ratios:

Vertical Distribution Chain		Horizontal Distribution Chain	
Income Ratios		Income Ratios	
Services and applications	4	Content	4
Systems and Platforms	2	Services and Applications	2
Components	1	Providers	1
Network	4		
Terminals	2		

New technologies, such as GPRS; EDGE, UMTS, xDSL, and FTTx, influence further development of new ICT services and at the same time enable the appearance of new business models. There are several types of subjects in new business models that can have different roles. Many business models and subject roles that make up a business model will evolve over time.

An important factor in the development of new products and services for users is the fact that the content providers (CPs) – that are not telecom companies – became an integral part of the service providing chain. In addition to the relation of the ultimate user and service provider (SP), the relation of the SP and the CP is one of the most important differences between the content oriented and other, traditional, services.

At the beginning of the chain are those that possess the information and content (that play an increasingly important role), then those that offer the content to the market in the form of services and applications, supplemented by those that offer the network type of services. Then come providers of services on which offered services and applications are performed, and the network with the task of delivering the information with desired quality. The last link in the chain is the intelligent terminal, through which users use the information.

It is necessary for the ICT industry in BIH to provide and ensure a mutual and balanced development of all the elements of its value chain.

23.6. ICT IN BIH AS A PRODUCTION AREA

Technological and commercial development connects the informatics, communications, trade and entertainment into one massive, consolidated industry. A part of the reason for this evolution is that an increasingly large number of users access the Internet through different terminal devices and different communication networks (ICT infrastructures), which enables them to use new kinds of services. A part of the machines and communication networks is already available at the BIH market, while, in near future, this offer will spread and increase.

By analyzing global trends in the area and determined goals of the ICT industry development in BIH, we tried to perceive the areas of the ICT industry with a greater degree of probability of the ICT industry development in BIH, i.e. the areas that offer greater business chances for its development.

We can say that the ICT production in BIH will develop and be based more in the sense of software production, rather than in hardware production. Hardware production is based on almost completely automatic processes that demand great investments, and they are profitable only if large quantities are produced. On the other hand, application production does not require capital investments, as in the case of hardware, and still represents technology with intensive development.

The is a limited number of countries in which the hardware production dominates over the software production, which can be seen from the production profit, in which services and applications participate with four times larger production income, than the production of components, and twice as great income than the system production. Additional support to the production of software in BIH is the fact that increasingly more:

- Hardware solutions are being replaced with software ones and
- Systems are being connected into networks that used to be unimaginable,
- Which opens additional space for the participation of BIH companies in this segment of production.

Also, we could say that the ICT services in BIH are going to develop even more in the direction of content oriented, rather than traditional services, with the domination of content and network services. Even the Internet in BIH is being transformed from a relatively cheap medium for advertising, marketing and user support, into a common platform for transactions and business applications.

The projects that will most affect the development of the ICT services in BIH are those that offer the possibility of productivity increase, facilitate the introduction of new production and business processes and new services. These projects are based on interdisciplinary cooperation of experts from different areas with the ICT industry experts. This cooperation can be at the local and/or regional level, depending on the goals of the project.

Through such interdisciplinary cooperation, new products and services can evolve, and be offered through various subjects and in different ways, depending on the type of the service, and the following needs to be mentioned:

- Portal (especially in mobile network services for location based services)
- Providers (fixed, mobile and Internet Service Providers),
- Global providers (that can offer global services which currently have obstacles, such as providing content oriented services and payment services in roaming),
- Companies that sell mass consumption goods, as well as leading trade chains (that can be SPs and/or MVNOs, through partnership with fixed operators),
- Card companies (as well as banks and other financial institutions with obviously wide space in the area of service charging due to their domination in PP).

24. THE ROAD TO ACHIEVING THE DESIRED STATE/RECOMMENDTAIONS

24.1. STATE MEASURES OF STIMULATING THE ICT INDUSTRY DEVELOPMENT

A) General Measures

1) Aggressive investments in human resources

- strengthen the education system,
- set high education standards,
- support companies in developing specialized knowledge and skills, by investing in training of employees. Achieve that through special tax incentives,

2) Support science and technology development

- create incentives for the research and development programs of the private sector, by establishing state science and technology funds in the volume of at least 1% of GDP,
- assist research and technology infrastructure for advanced technologies, especially in case of the ICT industry,
- promote wide diffusion of basic scientific knowledge,
- develop a state network of laboratories (certifying, and other), and use them solely for state missions,

3) Facilitate cluster development

- subordinate infrastructure projects to cluster development,
- establish the regional policy on encouraging cluster development, with Technology Parks and Incubation Centers as crucial instruments,

4) Stimulate early supply of the public sector ICT

- act as a sophisticated and honest buyer towards domestic companies, in cases of public procurements,
- develop regulatory mechanisms for the needs of public procurements, exclusively from domestic companies,
- develop regulatory mechanisms, which via public procurements, facilitate innovations and preparation of domestic ICT industry companies for competition with foreign companies,

5) Promote local competition

- regulate industrial structure,
- lead strict anti-monopolistic policy,

6) Encourage international trade and investments

- promote market openness through regulation. Arrange and harmonize the dynamics with the dynamics and intensity of implementation of enticing measures that prepare domestic ICT industry for the ability to compete with foreign companies,
- promote exports,
- attract to the country, by special advantages, adequate foreign investments, and if the investments are a part of the regional cluster framework, provide additional advantages,
- consider companies domestic, notwithstanding the origin of initial capital (foreign or domestic), on the condition that the company possesses other centers of competence in the country, besides the service and commercial one (production, research and development, production and provider services).

B) Special Measures

1) Customs policy measures

- by strict adherence to the UN Convention that the commodities for the purposes of science, education and culture are duty fee,
- exempt from duty the production materials needed for the ICT industry production, but on the basis of precise criteria,
- exempt from duty the imports of computers that are not produced by the domestic ICT industry, but on the basis of precise criteria,
- introduce stimulating measures for the export realized in the ICT industry.

2) Tax policy measures

- exempt from tax duties investments of domestic entrepreneurs in the ICT industry sector, in the amount in which international investors are exempted,
- introduce tax advantages for hiring staff in the ICT sector.

3) Establish the Agency for Partial Credit Insurance for credits taken by local entrepreneurs with commercial banks, for the purposes of production in the ICT industry sector. (Mortgage collateral is not a solution for the ICT industry because such industry does not invest in real-estate in the initial development stages. Leasing is not a solution, either, because equipment depreciation rates are rarely lower than 30% annually, so that payment of leasing is intolerable).

4) Establish a state fund for interest subsidizing for loans taken by entrepreneurs from the ICT industry sector. It is a well-known fact that the collateral credit and leasing are nor adequate for the ICT industry development, but the venture capital and equity. Since venture capital does not exist in our country, it is stimulated with this measure.

5) Strengthen the Export Credit Agency of BIH that would, as its priority, support exports of products and services of the domestic ICT industry (as do Cofas in France, Hermes in Germany, JUBMES in former Yugoslavia, etc.).

6) Create a group of statistical instruments which would enable comprehensive monitoring of the ICT industry development and make them mandatory in the entity and state agencies for statistics.

7) Condition the access to advantages from 1, 2, 3, 4, and 5 with:

- registration of companies with a single business activity, in accordance with the NACE/IKT/BA that is a proposal from this Strategy
- regular meeting of information requirements of the state and entity Statistics Agencies, especially in the ICT activities sector.

8) The state must establish technology parks and incubation centers.

The ICT industry, representing a group of small and middle companies, that are unable to posses their own research and development centers, or afford expensive professional legal services and services of professional economists and consultants, must have support of the state in initial phases of their establishment, in:

- the incubation period (preparation and evaluation of the business plan, company registration),
- technological product design, its perfecting and innovation.

In all developed countries, state investments in the establishment and partial maintenance of regional technology parks and incubation centers present one of the main instruments for SMEs, especially in propulsive technologies and industries targeted by the state.

9) Do all the necessary work on the removal of the lack of e-Legislature that affects the limited use and sale of equipment and services of the ICT industry.

24.2. APPROACH TO PRODUCTION AND ORGANIZATION

24.2.1. TECHNOLOGY PARKS

Swift progress of information technologies is the base of the new industrial revolution and has dramatic influence over all aspects of society development, that moves towards global Information Society. Not one modern country can be competitive in the era of increasing globalization without a vision and understanding of the ICT role, or a strategy of realization of the role completely, reaching the desired growth rates.

Research and development, new technology policy with the focus on ICT base, are the foundation of increased productivity growth in new growth areas, and basic factors in the creation of competitive abilities in all areas of industry.

Technology parks, in most cases, are integral parts of innovation centers for the transfer of technologies, as modern institutional, organization forms of timely functional connecting of the existing and new businesses with new technologies, with the use of knowledge, creativity and entrepreneur spirit.

A technology park is a space for developed physical, information and business and organization infrastructure in which new technologies appear and enable opening of highly productive jobs. In technology parks, research and development elements are functionally combined with entrepreneurship elements of profitability, and thus influence quicker economic development of an area, enable connections among areas of industry, and the formation of a harmonized structure of complementary and competitive companies for the development of clusters in the gravitational influence zone.

A technology park is a space for:

- trading experiences
- receiving new knowledge in the form of workshops and seminars
- establishing new business relations
- organizing contacts with the public
- participation in the international space
- organized marketing appearance
- connecting with government institutions, etc.

The entrepreneurship environment for the operation of technology parks is motivated by modern physical and information structure, as well as formed inspirational environment with necessary services.

The entrepreneurship environment for the operation of technology parks is motivated/characterized by:

- better possibility for cooperation with the industry,
- development of the entrepreneurship culture,
- less administration,
- clearly set tasks in the business plans,
- development of modern research infrastructure co-financed by the industry,
- multidisciplinary research approach and free formation of research teams,
- free formation of profit and investments in further development.

In relation to technology parks, Bosnia and Herzegovina has its advantages and significant resources that are based on:

- educated experts – Faculty of Electrical Engineering, Faculty of Natural Sciences and Mathematics, and other faculties provide top education that enables full competitiveness in the labor market,
- creativity and entrepreneur potential of the youth and

- openness towards the world and permanent communication of the young with the world.

That is a great potential that can best be activated and used if directed towards the creation of small development, entrepreneurship, high-tech companies that will compete in the global market with their information products and services.

Companies in technology parks in Bosnia and Herzegovina:

- can be a part of the foundation of the economic reconstruction,
- create new jobs and new tax payers,
- create new products and entice development initiatives in new technology areas,
- increase competitive ability of the economy in the area of high-tech products,
- hire young, educated staff and many experts that lost their jobs after many liquidations and closing of great businesses,
- create companies able to export.

24.2.2. INCUBATION CENTERS

Incubation centers today are profit organizations, above all, that express their interests in providing assistance to newly established companies through the charging a price for the use of offered equipment and services or a share in the company ownership.

An incubation center is an organizational and functional unit in which the entrepreneurship initiative is prepared and tested and, over the course of time, conditions for the independent operation of the company are created.

Incubators offer professional assistance, a whole set of basic services, such as: office services, access to computers, fax machines, coffee machines, mail delivery and shipment, etc. the most important service incubation centers provide is that of business consulting, which is achieved through a network of community content and the skills of the incubator manager. The manager is responsible for the development of the said network in a community or an area.

Incubation centers function in the manner that an entrepreneur sends a summary of his business plan to the business incubator. After the review of the summary, the management of the incubator invites the entrepreneur to present the entire business plan and answer the questions of the incubator management. If the appraisal of the business plan and potential entrepreneur is positive, the management decides to put the idea in ”incubation”. In that way, the potential entrepreneur is immediately provided with all the necessary business logistics. He is not forced to develop his idea in an inadequate space, improvised business environment, but instead, he has access to all the latest communication devices, equipment and other. This way, the entrepreneur has solved many initial problems, so that he and his team can dedicate their time to the development of the business exclusively.

There are other ways of company incubation today. There is an increasing presence of internal idea generation within the incubator itself, and then complete development of the idea and investment in company development, based on a concrete idea. Further procedure is the same – the firm develops up to a degree, until its shares appear in the capital market, and then the tendency is to sell the companies in the market, with possible keeping of a part of it, for the purposes of income from dividend.

In our environment, incubation centers are still a novelty, which is no surprising, considering the general uncertainty and unpredictability of economic conditions, that are too much even for venture capital.

In the economy of transition countries, the experience has shown that small local incubators, especially those with staff and space, that can easily be found, considering

the large number of unused state buildings, and start with operation with a relatively small amount of capital.

Bosnia and Herzegovina already possess two key elements for the development of necessary business incubators:

- unused business and economic property that can easily be redesigned into work space for small, newly established companies. Most of the real-estate is government property and can be used immediately,
- insufficiently exploited and present local potential in the form of consulting companies and agencies for providing business services.

The steps to be taken in order to establish incubation centers in B6H are:

- assessment of the market for the new companies,
- identification of space/location,
- appointment of the incubator manager,
- business plan preparation:
  - which business services to provide
  - rules of operation of the incubator
  - marketing strategy
- finance agreement
- finishing the incubator location
- identification of incubator lessee
- signing of the lease agreement.

24.2.3. CLUSTER PRODUCTION

Cluster production includes the establishment of rational and somewhat conditioned production of commodities and services, in a specific area, in a narrow or wide geographic space. At the same time, this is production in which several bidders compete in the cluster area, i.e. the area of grouped producers or service providers, for the same final product or service, with the Integrator.

Companies with a significant amount of capital, the products of which demand phase or segmented operation of individual participants in the cluster chain, usually appear as the Integrators of the final product, services or systems.

In current conditions in Bosnia and Herzegovina, several larger systems in the area of infrastructure, such as Telecommunications and Electric Power Company, that demand more of the ICT technology, could appear as Integrators, so in the following section we mention some of the possibilities, or activities of potential subjects, participant in cluster production.

Cluster production in the area of Telecoms. Several software, and even hardware products or service providers could be connected within and in relation to this activity. Considering that telecommunications are a line of economy that is a great user of software products, but also a technological basis for distributed and interactive use of products of information technologies, the initiation of the Project of the formation of software and hardware production in the said area is a logical step to be expected in real time.

In relation to software, we could say that the potential area of activities of daughter companies, and those that are not, might be:

- Development/software customization for equipment providers, or the Integrator,
- Development of software for innovative services, in accordance to the Integrator's own design (location based services, etc.),

- Development of software for the needs of content services (that are becoming extremely up-to-date with the spread of the Internet, development of call centers, spread of the TC network possibilities, especially mobile one, etc.) such as various information, interaction of TC equipment users and providers of specific types of services necessary for more effective living, etc.,
- Providing software services to interested companies acting as application service providers, with the use of data center and a private or public network to deliver services to the clients,
- Development of the software for the market.

In the area of hardware, it is necessary and possible to produce:

- Electronic fuses for devices in access networks, such as concentrators V5.2, xDSL modems, etc.,
- Elements of radio access networks (antennae, base station parts…) ,
- and many other hardware components.

Cluster production in the area of Electric Power Company. For the functioning and development of this system, it is necessary to:

- Develop, maintain and advance the software for the optimization of electric power system,
- Develop the software for charging and consumption control,
- Develop and advance the software for the management of the system load and consumption,
- Develop/customize the software for monitoring and management of small/river basin power plants,
- Etc.

Other cluster production. For numerous small and medium enterprises, it is possible to place cluster production in the area of:

- Microelectronics,
- Software engineering,
- Consulting,
- Etc.

24.3. REGIONAL COOPERATION IN THE PRODUCTION OF ICT EQUIPMENT

We are aware that, among other things, the size of the market in BIH and the ability of a firm to adjust to swift technological changes are the factors that will have the major influence on the development of the ICT industry in BIH. Goals iterated in this Strategy lead to the conclusion that the ICT industry needs to have regional orientation in the beginning of the development, considering the specifics of the industry and the size of the market in BIH.

Regional/international orientation means not only the presence at the markets of other countries, but also access to new information and technologies present at those markets. That means that t is not enough for a company to have a developed technological basis, but that it has to develop the cooperation with other firms present at markets of other countries, in the aim of the exchange of experiences gained in those markets.

Innovative networks can enable companies to access the information and resources, new markets and technologies. Companies from BIH have a chance to be included in innovative networks either through the choice of a partner that will enable them to access innovative networks that cannot be accessed without partners, or through strengthening of existing relations or creation of new ones in direct partnerships. The condition to be met before any kind of participation in the innovative networks is that the company has a developed

technological base in the degree that it is capable of exchanging new technological knowledge with partners.

The specifics of the choice of partners for long-term cooperation on the research and experimenting with new technologies is that the company does the research and experimenting together with partners in relation to new technologies and/or ventures. For the first step, it is realistic to establish cooperation among universities and other organizations that enable the development of specialist knowledge, which would facilitate the process of the creation of technology parks and incubation centers. After that, it can be expected that individual companies will establish this kind of cooperation with leading companies in the ICT industry.

The specifics of the choice of partners for short-term cooperation is that the firm should try, together with its partners, to place its technology and knowledge in an efficient manner, and perfect them in a routine and continued process. It is much easier (but not easy, because the company needs to reach a certain level of knowledge) to establish cooperation with the aim of using and perfecting existing knowledge. This kind of cooperation can be planned and controlled, and it increases the innovative performance of the company through daily contacts with partners. This type of cooperation is appropriate and above all recommended for companies fro BIH, because it provides results in relatively short period of time, and with relatively limited investments.

It is not necessary for partnerships in the ICT industry to be made up exclusively from companies from the same sub-area, event though they dominate multiple company partnerships. The alliances between ISPs and banks are well-known in the area of on-line banking service providing, between ISPs and travel agencies in the area of on-line services of travel agencies, ISPs, software companies and banks in the area of financial services providing at the B2B market, etc. such partnerships are suitable for the development of products that will limit the barriers of using ICT products and services.

Many factors influence the right choice of partners. In addition to defining own goals, that the company tries to realize through the partnership, the company needs also to be aware of the goals and interests of the potential partner. On the basis of complete review of the situation, the cooperation with the potential partner should be realistically appraised. Among the leaders in the ICT industry, those that do not have their own partners in the local language-speaking area should be sought as the partners, or those that see our market as their own chance.

24.4. THE ASPECT OF INTERGRATION IN THE ICT INDUSTRY OF THE EU

The ICT industry in BIH needs connection with an adequate industry in Europe for several reasons, and the basic ones are: technologies (transfer), management (advancement) and market (spread).

The EU ICT industry can be attracted to BIH by already acceptable conditions, i.e.: liberalized market of the ICT services, regulated issue of network interconnections among small network operators with the network of positioned operators (which provides for the possibility of product placement for content, service providers, etc.), still significant amount of open market penetration space in the area of TC and other services, unfinished privatization process, etc.

Special reasons of possible interest of the EU countries in BIH may be: cheap, and skilled labor force, possibility of transfer towards eastern markets, etc.

The interests of integration in the EU industry may be:

- Establishing “distant” organizational units of great systems that are or have been present or intend to come to the BIH market, for the purposes of project engineering, system and equipment maintenance, etc.,
- Organization of production of electric elements and/or fuses for technical systems for great business systems in BIH, as well as for the exports,
- Connecting the public with the private sector,

- Etc.

Cooperation of the SE Europe countries in the development of the information society of the region, within the framework of which BIH could have a significant role, is very important for the integration of Bosnia and Herzegovina in the ICT industry of the European Union.

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Zakon o komunikacijama (Sl. glasnik BiH br. 33/02)

Zakon o koncesijama u Bosni i Hecegovini (Sl. glasnik BiH br. 32/02)

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Zakon o prenosu, regulatoru i operateru sistema električne energije u Bosni i Hercegovini (Sl. glasnik BiH br. 7/00)

Zakon o registriranim zalogama na pokretnim stvarima i članskim udjelima (Sl. novine Federacije BiH br. 17/02)

Zakon o Savjetu ministara BiH (Sl. glasnik BiH br. 38/02)

Zakon o slobodi pristupa informacijama u Bosni i Hercegovini (Sl. glasnik BiH br. 28/00)

Zakon o slobodi pristupa informacijama u Federaciji Bosne i Hercegovine (Sl. novine Federacije BiH br. 31/01)

Zakon o slobodnim zonama u Bosni i Hercegovini (Sl. glasnik BiH br.3/02)

Zakon o statistici Bosne i Hercegovine (Sl. glasnik BiH br. 34/02)

Zakon o telekomunikacijama (Sl. glasnik BiH br. 28/00)

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APPENDIX: The Overview of Action Plan

Strategic guidelines clearly define courses of action through which one sould take in order achieve the vision set to 2004-2010 period. These strategic guidelines are to be concretized through activities defined in Action Plan. Detailed Action plan is given in separate document, but here we provide the short overview of these activities for each of development pillars.

ELEGISLATION

Project	Activity	Priorities
P01	Legislation for eBusiness	– The Law on Electronic Business Activities in BiH – The Law on Electronic Signature in BiH – The Law on the Certification Body in BiH – The Ordinance on the measures and actions of use and protection of the electronic signature and advanced electronic signature, the means for making the electronic signature and advanced electronic signature and the certification system and mandatory insurance of the qualified certificates issuance service provider – The Ordinance on the technical rules and conditions of connecting the electronic signature certification systems – The Ordinance on the registry of electronic signature certification service providers that issue qualified certificates – The Ordinance on the records of electronic signature certification service providers.
P02	Legislation for eEducation and eGovernment	– The Law on University Education – The Law on Scientific and Research Activity – The Law on Textbooks – The Law on Secondary Trade and Technical Schools – The Law on Permanent Education – As well as the corrections to the legislation on the customs and taxes on purchasing equipment and software by educational institutions, as incentives to the purchases. – The Law on Pre-school, Primary, and General Secondary Education – The Law on Copyright – The Ordinance on Public Procurement – The Law on State Registrars (which can be divided into civil, security and economy ones) – The Law on the Protection of Personal Data – The Law on Central Records and the Exchange of Data

Project	Activity	Priorities
P03	Legislation for the ICT Infrastructure and ICT Industry	– The Law on the Establishment of the Institute for Standards, Measurements and Intellectual Property of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 19/01) – The Law on Standardization of Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 19/01) – The Law on Telecommunication ("Official Gazette of Bosnia and Herzegovina", No. 2/24) – The Law on Free Access to Information in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 28/00) – The Law on Copyright and Related Rights in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 7/02) – The Law on Industrial Property in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 3/02) – The Law on Consumer Protection in Bosnia and Herzegovina ("Official Gazette of Bosnia and Herzegovina", No. 17/02).

EEDUCATION

REMARK: Sequence in which activities are listed does not reflect order of priorities. All activities are considered as priorities and of strategic importance. Relatively, one to each other, activities are prioritized as:

(1) of essential importance – implementation must strat immediately;

(2) of strategic importance – implementation shall start as soon as possible;

(3) important activity – also of strategic importance, but implementation can be delayed.

PROGRAMS

Program	Priority	Activity	Field(s)	Executor and Participants	Period	Financial estimate
PG01	(3)	Establishing system of ICT education and certification of citizens by means of post-education and life-long learning	Post-education and life-long learning	Information Society Agency; Education Ministries; competent ministries for the field of economy, technologies etc.; BHITS Association, BiH eLearning Task Force, Certified education centers, FBiH and RS Standards and Assessment Agency	2005-2006., 12 months initially, and then in continued manner	– Initial costs around 100.000 KM; – 20.000KM/per month per education center
PG02	(2)	Including certified education and examination centers into the system of official (public and private) system of ICT education (secondary schools and faculties)	Post-education and life-long learning	Information Society Agency, Entity Ministries of Science and Education, Ministries of Labor/Employment Bureaus, Faculties/Universities, Pedagogic Institutes, Certified education and examination centers	2005-2006., 6-12 months initially, and then in continued manner	– No particular investments
PG03	(3)	Information Society Referential Center (Knowledge Navigation Center)	Increase of knowledge about the information society	Information Society Agency	2005-2006., 6-12 inauguration of center, and then in continued manner	– 300.000 KM Center inauguration – 180.000 KM annually
PG04	(2)	System of ICT education and certification of teachers in primary and secondary schools	Specialist ICT education	FBiH and RS Standards and Assessment Agency; Education Ministries and Pedagogic Institutes; Universities and education centers (private and public); Information Society Agency; Teachers of Information Science, primary and secondary schools – users	2005., preparation, then permanently	– Initial costs around 300.000 KM; – 100.000 KM annually

PG05	(3)	Registry of scientific and research work in BiH	Scientific and research work	National and University Library of BiH; State, Entity and Cantonal level competent Ministries; research-education network; Universities and other scientific and research institutions	2005-2006., preparation, then permanently	– Initial costs around 350.000 KM; – 150.000 KM annually
PG06	(3)	Accessibility of aggregate bibliographic data bases to the education and library system in Bosnia and Herzegovina	Scientific and research work; Libraries	National and University Library of BiH; Academic Network of BiH, Information Society Agency or separately formed body, AIC library consortium.	Permanent Activity	– 120.000 KM annually
PG07	(1)	LIS/OPAC cooperative system of cataloguing library resources	Libraries	COBISS Center; independent or libraries part of other institutions	Permanent Activity	– 200.000 KM annual budget – Additional participation of libraries
PG08	(1)	Acquiring, maintaining and using the national ECDL license	Specialist ICT education; Increase of digital literacy	ECDL BiH Association; Information Society Agency BiH; FBiH and RS Standards and Assessment Agency; Education Ministries and Pedagogic Institutes; OSCE as principal stakeholder - harmonization of education programs	2005. 12 moths of preparation and then permanent activity	– 200.000 KM initially – 180.000 KM annually
PG09	(2)	Digitalization of mobile cultural and historic heritage	Libraries	Consortium of Institutions involved in the domain of culture and leading libraries; Archive and library institutions and museums in Bosnia and Herzegovina	2005.-2015. Later on permanent activity	– 2.000.000 KM annually

PROJECTS

Project	Priority	Activity	Field(s)	Stakeholder and Participants	Period	Financial estimate
PJ01	(1)	Designing basics of IT study programs curricula and syllabi in accordance with EU trends	Specialist ICT education	Education Ministries; All BiH Universities; Consortium of teachers from IT Faculties in Sarajevo, Banja Luka, Tuzla and Mostar as separately organized professional body; BHITS Association	2005., 9 months	150.000 KM
PJ02	(3)	Launching internationally recognized and indexed scientific ICT magazine	Scientific and research work	One University or Faculty from BiH or Association of IT Professionals or the BiH Academic and Research Network; Ministries of Science - co financing of magazine; Universities and other scientific and research institutions - direct users	2005-2006. two first years	– 300.000 KM
PJ04	(1)	Revitalization of BIHARNET into a sustainable research-academic network	Research-academic networks	Information Society Agency BiH (if established by the end of 2004) or BIHARNET Center; Council of Ministers of BiH, Government of the Federation of BiH, Republika Srpska Government and competent Cantonal Ministries. All beneficiaries: Universities, schools (primary and secondary), institutes, museums, archives.	2005-2010., five year period	– 15.000.000 KM
PJ05	(1)	Connecting all education and research institutions to Internet	Connection	Research and Academic network of BiH; Council of Ministers of BiH, FBIH Ministry of Science and Technology, RS Ministry of Science and Technology , Cantonal and Entity Education Ministries, telecom operators and Internet Service Providers, all users: Universities , schools (primary and secondary),institutes, libraries, museums, archives, students dormitories	2005-2010., five year period	– 25.000.000 KM
PJ06	(1)	Enhancing and harmonizing computer capacities in teaching and scientific-research institutions	Computer capacities	Information Society Agency; National Academic and Research Network; BHITS – BiH Association of IT Professionals; Association BAIT, IT companies in BiH, and representative offices of world ICT equipment manufacturers; Institute of Standardization, Measuring, Patents and Intellectual Property of BiH ((BASMP)-Technical Committee; TC1 (Information Technologies); eLearning Task Force; Service Providers- telecoms and ISP; Education and research institutions(schools, Universities, institutes) – end users	10 years First three phases between 2005-2008. (3-4 years); 6 years for the last phase	– First three phases around 20.000.000 KM – Last phase around 80.000.000 KM

PJ07	(3)	Standardization of ICT capacities in education and research institutions	Computer capacities	Information Society Agency; (BASMP) – Technical Committee TC1 (Information Technologies); National Academic and Research Network; Faculties in ICT field; BHITS – BiH Association IT Professionals; Institute of Standardization, Measuring, Patents and Intellectual Property of BiH; Association BAIT, IT companies in BiH, and representative offices of world ICT equipment manufacturers; BiH eLearning Task Force ; Education and research institutions– end users	2005., 6 months	– 200.000 KM
PJ08	(2)	Development of electronic support to learning (eLearning) at BiH Universities	Electronically supported learning	eLearning Task Force; eLearning Centers/Institutes; University Computer Centers; National Academic and Research Network; University Academic Staff; Institute of Standardization, Measuring, Patents and Intellectual Property of BiH	2005-2007, 2-3 years	– 3.000.000 KM
PJ09	(2)	Preparing Uniform Development platform for EMIS in primary and secondary schools	Education Management Systems	Two Entity Education Ministries; Information Society Agency; Cantonal Education Ministries; representatives of primary and secondary schools	2005. 6 months	– 80.000 KM
PJ10	(2)	Designing and implementing type concept of EMIS for primary and secondary schools	Education Management Systems	Two Entity Education Ministries; Information Society Agency; Cantonal Education Ministries; representatives of primary and secondary schools	2005-2007. 2 years	– 550.000 KM – Annual maintenance 120.000 KM
PJ11	(2)	Preparing Uniform Development platform for University EMIS	Education Management Systems	Consortium of all Universities in BiH; Information Society Agency, Education Ministries at all levels	2005. 6 months	– 80.000 KM
PJ12	(2)	Designing and implementing University EMIS	Education Management Systems	Consortium of Universities interested in joint development of EMIS; competent Education Ministries	2005-2007. 2 years	– 750.000 KM – Annual maintenance 60.000 KM per University
PJ13	(3)	Set-up of database and applicative software for external evaluation of knowledge in primary and secondary schools	Computer capacities; Education Management Systems	Standards and Assessments Agency; Curriculum Agency, Ministries of Science and Education , Pedagogic Institute	2005-2006. 12 months	– 120.000 KM software design – 60.000 KM annual database maintenance

PJ14	(1)	Standardization of IT syllabus for secondary vocational schools and elective teaching in information science in general high school (gymnasiums)	Evolution of Curricula; Specialist ICT education	Curriculum Agency; Standards and Assessments Agency; Ministries of Science and Education ; Pedagogic Institute	2005-2006. 2 years	– 400.000 KM

INITIATIVES

Initiative	Prority	Activity	Field(s)	Stakeholder and Participants	Period	Financial estimate
IN01	(3)	Promotion of Open Source (OP) standard operation systems and applications at education and other public institutions	Computer capacities	LUG (Linux Association); Ministries of Education, Science and Technology, Ministries of Communication; BHITS Association	Permanently within planned timeframe 2005.-2010.	– 150.000 KM annually
IN02	(3)	Popularize use of ICT in education	Increase of knowledge about the information society	Association of IT Professionals of BiH; Media, electronic media in the first place (TV, radio, e-zines); INFO and MOBiH magazines, as well as similar information science magazines in BiH; Academic and Research Network of BiH; Primary and secondary schools and faculties	Permanent Activity	– 200.000 KM annually

EGOVERNANCE

REMARK: Sequence in which activities are listed does not reflect order of priorities. All activities are considered as priorities and of strategic importance. Relatively, one to each other, activities are prioritized as:

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(3) important activity – also of strategic importance, but implementation can be delayed.

No.	Prio-rity	Activity	Type	Field	Stakeholder and participants	Timeframe	Fin (KM)
1	(1)	Drafting detailed network plan of implementation of projects envisaged by the Action Plan	F	(1-11)	AIS, ENT, DISTR	2004	500 000
2	(1)	Ensuring legislative framework for eGovernance development	F, U	RU (1)	AIS, SMBH, ENT, DISTR	2004 – 2006	250 000
3	(2)	Reconstruction of administration	F	RU (1)	AIS, SMBH, ENT, DISTR	2004 – 2006	2 000 000
4	(3)	Promotion of introduction of eGovernance	O	RU (1)	AIS, SMBH, ENT, DISTR	Continuous	100 000 annually
5	(1)	Formation of bodies/services tasked with informatization and strategy implementation and identification of persons-stakeholders for informatization in government bodies	P	TRO (2)	SMBH, ENT, DISTR, KAN, LOK	2004	-
6	(3)	Establishment of the eGovernance Development Forum	O	(1) - (11)	AIS, ENT, DISTR, KAN, LOK	2004	-
7	(3)	Establishment of eMunicipalities Association	O	(1) - (11)	LOK	2004	-
8	(1)	Analysis of potential and recommendations for computer program of open software	F	TRO (2)	AIS, ENT, DISTR	2004 – 2005	300 000
9	(2)	Development and definition of methodology for development of programs and systems in public administration	P	TRO (2)	AIS, ENT, DISTR	2004 - 2005	200 000
10	(3)	Development of management methodology for information-communication projects in public administration	P	TRO (2)	AIS, ENT, DISTR	2004 - 2005	200 000
11	(1)	Identification, systematization and adoption of standards necessary for development of information society in Bosnia and Herzegovina	F	TRO (2)	AIS, ENT, DISTR	2004 – 2006	200 000

No.	Prio-rity	Activity	Type	Field	Stakeholder and participants	Timeframe	Fin (KM)
12	(3)	Training and education of staff	P	TRO (2)	AIS, ENT, DISTR, KAN, LOK	Continuous	300 000 annually
13	(1)	Communication infrastructure project in the public sector of Bosnia and Herzegovina	F	INFRA (3)	AIS, ENT, DISTR, telecom operators, Elektroprivreda, Railways, private sector	2004 – 2005	500 000
14	(1)	Implementation of the communication infrastructure project in the BiH public sector	F	INFRA (3)	AIS, ENT, DISTR, KANT, LOK	2006 – 2007	30 000 000
15	(1)	Defining concepts and standards for IT inter-operability in the public sector	F	MOPER (4)	AIS, ENT, DISTR	2004 – 2005	350 000
16	(2)	Implementation of pilot project to verify and render operational the inter-operability concept	F	MOPER (4)	AIS, ENT, DISTR	2006 – 2007	350 000
17	(3)	Establishment of the IT Inter-operability Forum	O	MOPER (4)	AIS, ENT, DISTR, KAN, LOK, private sector	2005	-
18	(3)	SMS Gateway	O	MOPER (4)	AIS	2004 – 2005	100 000
19	(3)	Information exchange server - National Gateway Server	O	MOPER (4)	SMBH, AIS,	2004 – 2005	300 000
20	(2)	Management of electronic records	F	FR (5),	AIS	2004 – 2005	200 000
21	(1)	Procedures and conditions of access and use of information from fundamental registers	F	FR (5)	AIS	2004 – 2005	80 000
22	(1)	On-line personal and vehicle registration documents	F, U	FR (5), SER(10)	AIS	2006 – 2008	600 000
23	(1)	On-line registration of change of residence	U	FR (5), SER(10)	AIS	2007 – 2008	200 000
24	(1)	Register of residence licenses for foreigners, visas, records of entries in and exit out of BiH	U	FR (5), SER(10)	SMBH, AIS	2004 – 2005	1 000 000
25	(1)	Harmonization and connection/integration of partial registers	F	FR (5)	AIS, ENT, DISTR, KAN, LOK	2004 – 2007	1 000 000

No.	Prio-rity	Activity	Type	Field	Stakeholder and participants	Timeframe	Fin (KM)
26	(2)	Tax system	F, E, U	FR (5), ZFU (7), SFU (8)	AIS	2004 – 2006	4 000 000
27	(2)	Tax system – on-line	F, E, U	FR (5), SER(10)	AIS	2007 – 2009	2 000 000
28	(2)	Customs declarations– on-line	U	FR (5) , SER(10)	AIS	2007 – 2008	400 00
29	(2)	Security strategy in organizational units of the administration	F	SIG (6)	AIS, ENT, DISTR	2004 – 2005	80 000
30	(1)	Defining and developing uniform authentification and authorization system	F	SIG (6)	AIS, ENT, DISTR, KAN, LOK	2004 – 2006	1 200 000
31	(2)	Project to introduce PKI infrastructure	F	SIG (6)	AIS, ENT, DISTR	2004 – 2006	200 000
32	(2)	Pilot project to implement PKI infrastructure	F	SIG (6)	AIS, ENT, DISTR,	2006 – 2007	1 000 000
33	(2)	Identification of joint functions of the administration	F	ZFU (7)	ENT, DISTR, AIS, KANT, LOK	2004	80 000
34	(2)	e-mail service in public administration	F	ZFU (7)	ENT, DISTR, AIS, KANT, LOK	2004 – 2005	300 000
35	(2)	Project and implementation of EDMS and Workflow systems	F, E	ZFU (7)	ENT, DISTR, AIS, KANT, LOK	2005 – 2007	6 000 000
36	(2)	eProcurement in public administration– Project	F, U	ZFU (7)	AIS, ENT, DISTR	2004 – 2005	200 000
37	(2)	eProcurement in public administration– Pilot-project	F, U	ZFU (7)	AIS, ENT, DISTR	2006 – 2007	500 000
38	(2)	Implementation of eProcurement in public administration [e]	F, U	ZFU (7)	AIS, ENT, DISTR	2007 – 2008	3 000 000
39	(2)	Project to define statistical parameters and indicators of development of eGovernance, method of collecting and monitoring	F, U	ZFU (7)	Stat. agencies/inst., AIS, ENT, DISTR	2004 – 2005	100 000
40	(3)	Automatized (on-line) submission of information to institutions dealing with statistics	U	ZFU (7), SER (10)	AIS, ENT, DISTR, statistics institutes	2007 – 2010	2 500 000
41	(2)	Monitoring eGovernance development	F	(1-11)	Stat. Agencies/inst., AIS, ENT, DISTR	2005 -	1 000 000

No.	Prio-rity	Activity	Type	Field	Stakeholder and participants	Timeframe	Fin (KM)
42	(1)	Citizens Database – Municipal register offices (births, marriages, deceased and book of nationality-holders)	F, E, U	FR (5), ZFU (7), SFU (8)	LOK, ENT, DISTR, KANT, AIS,	2004 - 2006	1 200 000
43	(2)	Citizens Database – Municipal register offices (births, marriages, deceased and book of nationality-holders)– on-line	F, E, U	FR (5), ZFU (7), SFU (8), SER (10)	LOK, ENT, DISTR, KANT, AIS	2007 - 2008	800 000
44	(1)	Land and real-estate register	F	SFU (8)	ENT, DISTR, KANT, LOK, AIS	2004– 2007	6 000 000
45	(2)	Land and real-estate register – on-line	F	SFU (8)	ENT, DISTR, KANT, LOK, AIS	2007 – 2008	2 000 000
46	(2)	Information system for personnel and legal affairs	E	SFU (8)	ENT, DISTR, KANT, LOK, AIS	2004 – 2005	300 000
47	(1)	Computer programs for construction licenses	U	SFU (8)	LOK, ENT, DISTR, KANT, AIS	2004 – 2006	1 200 000
48	(2)	Computer programs for construction licenses– on-line	U	SFU (8) SER(10)	LOK, ENT, DISTR, KANT, AIS	2007 – 2009	1 500 000
49	(2)	Job search	U	SFU (8)	ENT, DISTR, KANT, AIS, LOK	2007 – 2008	500 000
50	(2)	Social privileges	U	SFU (8)	LOK, ENT, DISTR, KANT	2007 – 2008	500 000
51	(2)	Social benefits for employees	U	SFU (8)	ENT, DISTR, KANT, LOK	2007 – 2008	800 000
52	(2)	Environment-related licenses	U	SFU (8)	LOK, ENT, DISTR, KANT,	2007 – 2008	500 000
53	(2)	Information system for inspection tasks	O	SFU (8)	AIS, ENT, DISTR, KANT, LOK	2005	500 000
54	(1)	Register of legal entities	F	SFU (8)	AIS, ENT, DISTR, KANT, LOK	2005 - 2006	300 000
55	(2)	Register of domestic animals	O	SFU (8)	Agency	2005- 2006	700 000

No.	Prio-rity	Activity	Type	Field	Stakeholder and participants	Timeframe	Fin (KM)
56	(3)	eParticipation	O	DEM (9), SER (10), PORT (11)	AIS, ENT, DISTR, KANT, LOK	2007 – 2008	900 000
57	(3)	Generic eService project	F, U	SER (10)	AIS, ENT, DISTR, KANT, LOK	2005 – 2006	250 000
58	(3)	All municipalities on Internet	F, E, U	PORT (11)	AIS, ENT, DISTR, LOK	2004 – 2005	1 600 000
59	(1)	State portal	F, E, U	PORT (11)	AIS, ENT, DISTR,	2004 – 2005	1 000 000

ICT INFRASTRUCTURE

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ACTIVITIES

Project	Activity	Executors and Participants	Period	Financial projection
PJ01	ICT-Highway	The Council of Ministers and entity governments; Positioned 3 TK operators in BIH; Electrical Power Company, Railroad Company (additional and alternative solutions); State Projects: CIPS, State Border Service, Customs Administration etc. Institute for Traffic, universities – Faculty of Electrical Engineering and the Faculty of Traffic and Communications; Independent Consulting Company	2004-2006	– Project preparation circa 100.000 KM; – Implementation circa 5.000.000 KM
PJ02	IP-telephony	Three positioned TC operators in BIH; Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications; Regulatory Communications Agency; Mobile operators;	2004-2006	– Project preparation circa 50.000 KM; – Implementation circa 3.000.000 KM
PJ03	DTM Network – Pilot-project of introducing new network technology – DTM for integrated service networks	Three positioned TC operators in BIH; Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications;	2004-2006	– Project preparation circa 50.000 KM; – Implementation circa 1.000.000 KM
PJ04	VPN Network –VPN service introduction project	Three positioned TC operators in BIH; Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications; Electrical Power Company, Railroad Company; government organizations; health care institutions; Universities; schools, libraries; business companies; banks and insurance companies; police, ...	2004-2006	– Project preparation circa 50.000 KM; – Implementation circa 1+20.000.000 KM

PJ05	Migration from 2G to 2,5 MK --- Evolution from 2G to 3G mobile communication systems	Licensed mobile communications operators in BIH; Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications; Electrical Power Company; service providers	2004-2006	– circa 50.000 KM;
PJ06	Broadband access networks: xDSL, HFC, PLC, broadband access	Three positioned TC operators in BIH; network operators, electrical power companies, cable operators. Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications; Service providers	2004-2005	– circa 150.000 KM;
PJ07	Ethernet WAN – Pilot-project of the creation of MAN network with Ethernet access to the core network	Three positioned TC operators in BIH; Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications; Electrical Power Company, Railroad Company, and new network operators	2004-2006	– Project preparation circa 50.000 KM; – Implementation circa 2.000.000 KM
PJ08	W LAN – Pilot-project of W LAN creation	Three positioned TC operators in BIH, each for its network; Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications; New telecommunication services operators	2004-2005	– Project preparation circa 50.000 KM; – Implementation circa 500.000 KM
PJ09	Portal development	Agency for information society, Institutes, professional associations, consulting companies, Faculty of Electrical Engineering and the Faculty of Traffic and Communications, three positioned TC operators in BIH, service providers, government institutions.	2004-2005	– circa 200.000 KM;

ICT INDUSTRY

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GENERAL ACTIVITIES

Activity	Priority	Activity	Type of Act.	Executor and Participants	Period	Financial Estimate
A1	(2)	Motivating Customs and Tax Measures	Initiative	Ministry of Finance of BIH/Entity Ministries of Finance; Council of Ministers of BIH and Entity Governments (adopting decisions in the initiative realization process)	Finish by June 2005	no expenses
A2	(2)	Motivating Early Local Supply and Demand Measures	Initiative	Ministry of Economy and International Trade; Ministry of Finance of BIH; Council of Ministers of BIH (adopting decisions in the initiative realization process)	Finish by June 2005	50.000 KM
A3	(1)	Credit Insurance Agency (for ICT Industry stimulation credits)	Initiative/ Action	Ministry of Finance of BIH; Council of Ministers of BIH (adopting decisions in the initiative realization process)	Finish by end of 2004	200.000 KM
A4	(2)	Statistical Instruments of ICT Industry Monitoring	Project	Institute of Statistics of Bosnia and Herzegovina; Consumer Association; Chamber of Commerce	Finish by end of 2004	500.000 KM
A5	(1)	e-Legislation	Program/ Project	Ministry of Communication and Transport and UNDP CO BiH; Ministry of Justice; Ministry of Economy and International Trade of Bosnia and Herzegovina; State Court of Bosnia and Herzegovina.	Implementation has started. Finish expected by mid' 2005.	980.000 KM

SPECIAL ACTIVITIES

Activity	Priority	Activity	Type of Act.	Executor and Participants	Period	Financial Estimate
A6	(1)	Technology park in the area of ICT	Project	Agency of Information Society of BIH; University and Faculties; local authorities; ICT companies	2004-2005.	Pilot: 3.000.000 KM

Activity	Priority	Activity	Type of Act.	Executor and Participants	Period	Financial Estimate
A7	(1)	Incubation center in the area of ICT	Project	Agency of Information Society of BIH; Foreign Investments Agency; Local Administration; University	2004-2005.	Pilot: 550.000 KM
A8	(3)	"Telecom Cluster" of the ICT services	Project /Pilot	Positioned operators of TC; Potential producers, recruited by the Association or Chamber of Commerce	2005	Pilot: 4.000.000 KM
A9	(3)	"Elektroprivreda Cluster" of the ICT services	Project /Pilot	Electrical companies (EC) in BIH; Potential producers, recruited by the Association or Chamber of Commerce	2005-2006	Pilot: 2.000.000 KM
A10	(3)	Cluster production of ICT hardware	Project /Pilot	Agency for Information Society; Chamber of International Trading of BIH	2005-2006	Pilot: 2.000.000 KM
A11	(3)	Cluster production of ICT software	Project /Pilot	Agency for Information Society; Chamber of International Trading of BIH	2005-2006	Pilot: 2.000.000 KM