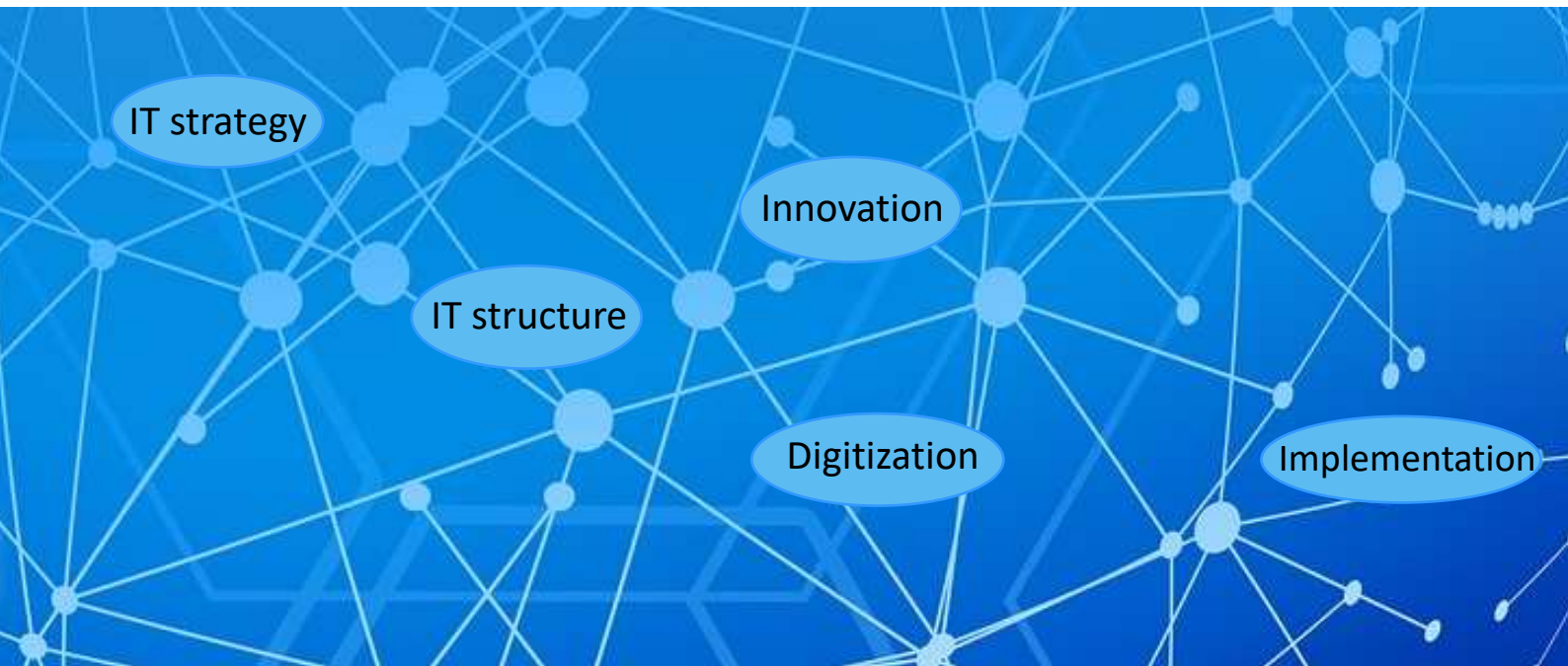


COLLECTION OF EVENT REPORTS:

MODERNIZATION OF AFGHANISTAN UNDER CERTAIN FRAMEWORK CONDITIONS



Information Technology

International events of the Center for International and Intercultural
Communication (ZiiK) of the TU Berlin
2001 to 2021

Nazir Peroz

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Collection of Event Reports:

MODERNIZATION OF AFGHANISTAN UNDER CERTAIN
FRAMEWORK CONDITIONS

PROGRAMM UND ORGANISATION

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PHOTOS

MoHE, ITCC Afghanistan and ZiiK of the TU Berlin

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Preface

Since 2001, the Center for international and intercultural Communication (Ziik) of TU Berlin has organized and realized more than 30 events, conferences, symposia, seminars, and workshops on the topic of "Modernizing Afghanistan", under my direction in Germany and in Afghanistan.

In this book, the term "modernization" means the creation of modern IT structures which are following a thorough IT strategy plan and which consist of the following components:

- Infrastructure like power supply, Internet connectivity, governmental, academic, and private networks, IT systems, software applications, IT services, computer centers, PC labs, buildings, etc.,
- Education of qualified IT staff, computer scientists, and academic staff, as well as creating awareness throughout society,
- Management as an organizational measure to modernize the public administration, IT legislation, and policies, and
- IT Security.

These are the basic components for the development, deployment and use of modern IT structures to create a globalized, information- and knowledge-based, highly efficient and highly interconnected Afghanistan. Besides taking into account functional and economic aspects, such modern IT structures can only be established successfully if IT security is also considered. Modernization without a strategy, planning, or an IT security concept will cause unpredictable risks and costs.

It was the goal of these events to discuss about aspects of modern IT structures with representatives of the Afghan government, public authorities, universities, Afghan computer scientists, computer science Master's graduates of TU Berlin, representatives of World Bank, UNESCO, USAid, NATO, DAAD, as well as international guests. Key tasks of the participants were to find solutions, make decisions, and create exchange. The events were funded by the Heinrich Böll Foundation, the Konrad Adenauer Foundation, DAAD, and the Federal Foreign Office, and supported by the Afghan Ministry of Higher Education (MoHE) and Afghan universities.

Particular topics were:

- Digital Media - An opportunity for education in Afghanistan
- The state of academic education in Afghanistan - accounts and perspectives
- Reconstructing universities in Afghanistan
- Experiences of Afghan lecturers at institutions of higher education
- Implementing Information and Communication Technology in developing countries by the example of Afghanistan
- Basics for an Educational Strategy in Afghanistan
- Afghanistan Week
- IT Strategy by the example of Afghanistan
- IT Concept for the Ministry of Higher Education

- Academic reconstruction in Afghanistan - achievements and perspectives
- IT infrastructure in Afghanistan
- IT security
- IT situation at Afghan universities
- Berlin Dialogue - A Bridge between Germany and Afghanistan
- Development of the IT structures in Afghanistan
- Sustainable and Secure IT Supply for the Area of Higher Education in Afghanistan
- IT Strategy for Higher Education and IT Curriculum
- IT security for Afghanistan
- Application project by computer science Master's graduates from TU Berlin
- Current situation and perspectives of IT
- Innovation and education in computer science for Afghanistan
- Improvement and challenges
- Cyber security
- Modernizing and unifying management systems for IT services
- IT Strategic Plan for Afghanistan
- Measures and implementation of the Digital Strategy for Afghanistan

While initially, the Afghan institutions and authorities did not realize the importance of modern IT structures for administrative processes, this attitude changed around 2012 through the increasing pressure of global digitization. Transparency and citizen-friendliness more and more became a political asset. Also, in 2017, president Dr. Ashraf Ghani declared this one of his personal goals.

With the aforementioned topics, we tried to focus the events on the relevance of each of the basic components of modern IT structures and made an attempt to put them in relation to an entire national digital strategy for Afghanistan. In addition to that, we tried to find answers on the following questions:

- Which role does Afghanistan want to play in a digitized and globalized future?
- How can Afghanistan develop and secure its academic and industrial location with the help of digital technologies?
- Which requirements are to be met for a stable, secure and effective digital landscape?
- Which measures are to be taken to make digital processes secure?
- Which education concepts are relevant for the particular situation in Afghanistan, and how can education and further training in the field of IT be improved?
- How can Afghanistan digitization be funded?

Unfortunately, due to a lack of management, expert knowledge, and wrong political decisions, the development of digitization and finding answers to these questions was neglected by politics. Instead, decision makers were acting without proper understanding and without taking into account the technological, economic, and societal development of Afghanistan. Third-party funds were accepted without an overarching concept. This often

lead to isolated IT solutions at Afghan institutions which in turn resulted in redundancies and incompatibilities, causing an enormous waste of financial and human resources.

The development of new technologies and the digitization of Afghanistan are creating tremendous challenges for its institutions and authorities. A lack of qualified IT staff, of missing IT infrastructures, of concepts, and of management are but a few of these challenges politics has to face. Depending on the future politics of Afghanistan, digitization will have the best or the worst outcomes. It all depends on how the relationship between the state, the economy, science and society will develop in the years to come. Will the international community further support Afghanistan? It is crucial to create a network of professionals which brings together information, technology, organization, and production by an effective management.

The book at hand, "Collection of Event Reports" is less of a professional reference book but rather a document for political orientation.

The first part provides a brief summary and the results of a few events which took place from 2001 to 2008 in Germany and Afghanistan. The second part is a comprehensive report of the international IT conferences from 2008 to 2019 in Afghanistan. The IT conference in 2020 had to be cancelled due to the Corona pandemic. End of January 2021, the graduation event of the fifth generation of the computer science Master's program at TU Berlin took place as an online event, and is also documented in this book.

This is to provide the reader an overview of the challenges of digitization in Afghanistan and its development. This is completed by two annexes: pictures of the conferences in Afghanistan, and a proposal for a Digitization Strategy for Afghanistan 2020 which was presented at the last IT conference in 2019.

Nazir Peroz

First section
Brief summary of the events
in Germany and Afghanistan
2001 - 2008

December 10 – 14, 2001
Culture and Dialog week in Berlin



Within the scope of this culture and dialog week, topics like globalization, democratization processes, human rights, influences of technology on society, the Afghan wars and the media as well as the role of the Taliban were discussed. On the last day, the focus was laid on the topic of reconstructing the educational system in Afghanistan. All attending experts and guests agreed that education and training

belong to the core components within the reconstruction process in Afghanistan. The discussion resulted in the following conclusions:

Afghanistan is in need of an educational concept that is elaborated in legal and political terms. The impact of two decades of war on the area of education is to be surveyed and analyzed, and all deficits to be eliminated by both ad hoc measures and long-term planned projects. Both approaches shall equally include women and men in Afghanistan, and the commitment of Afghans who live in exile shall be taken into account as well. The population's awareness for all problems resulting from the low literacy rate is to be sharpened.

It was also agreed to invite a representative from the MoHE to the next conference in February 2002.

Im Rahmen dieses Band stelle ich kurz einige Veranstaltungen bis 2010, die in Deutschland und einige, die in Afghanistan durchgeführt wurden:

February 16 – 17, 2002

Symposium: Digital Media – An Opportunity for Education in Afghanistan? in Berlin



Prof. Akbar Popal, former President of Kabul University, attended the symposium as keynote speaker at the TU Berlin. The topics of the discussions dealt with possible options regarding the educational situation in Afghanistan, how to assess them and how to develop supporting programs. The participants also talked about exchange programs for German and Afghan students as well as lecturers, organizing

workshops in Germany and Afghanistan and specialized training programs for lecturers in cooperation with the universities.

August 12, 2002

Workshop: The State of Academic Education in Afghanistan – Accounts and Perspectives in Berlin

In this workshop, the current status of the academic structures at Afghan universities was compared to those at German universities to gather insights and to find out to what extent

they could be applied to Afghan higher education institutions. Four areas were of prime importance:

- administration and organization
- teaching and research
- central services
- technical infrastructure

In addition, a discussion took place with Prof. Akbar Popal, former President of Kabul University, experts, representatives from different development aid organizations, and university professors. It mainly focused on the question how to establish sustainable academic structures, especially in Afghanistan. To allow further discussions on these topics with Afghan lecturers, the Konrad Adenauer Foundation in cooperation with the TU Berlin organized a subsequent conference in Kabul.

August 28 – 29, 2002

Symposium: Reconstructing Universities in Afghanistan in Kabul

On behalf of the Konrad Adenauer Foundation, three representatives from the TU Berlin, Prof. Bernd Mahr, Dr. Janko Jochimsen, Dr. Thomas Kathöfer and Dr. Nazir Peroz, traveled to Kabul to discuss the topics that had arisen during the workshop two weeks before at TU Berlin:

- administration and organization
- teaching and research
- central services

The discussion in Berlin had shown that academic structures in Afghanistan were in need of a reliable solution approach. Thus, Prof. Mahr drafted a concept and presented it to Dr. Fayez, the former Minister for Higher Education in Afghanistan.

October 11, 2002

Workshop: Experiences of Afghan Lecturers at Institutions of Higher Education in Berlin

Sixteen Afghan lecturers and administrative affiliates from the MoHE and Afghan universities participated in the first winter academy at TU Berlin. With their help, a workshop was organized to discuss their impressions about Afghanistan and the experiences they had gathered during the winter academy. Soon, it became apparent that all participants regarded the liberation of Afghanistan as an opportunity for development.

They were of the opinion that Afghanistan needed sustainable educational concepts and wished for a continuous support from Germany and the world community as well as a close cooperation between the mentioned parties and the responsible decision makers in Afghanistan.

October 18 – 20, 2002

Workshop: Implementing Information and Communication Technology in Developing Countries by the Example of Afghanistan in Freiburg

The former President of Kabul University, Prof. Akbar Popal, was invited to give the keynote speech at the annual FIF meeting in Freiburg (Forum InformatikerInnen für Frieden und gesellschaftliche Verantwortung e.V., German Computer Scientists Forum for Peace and Social Responsibility). The arguments he presented in favor of a consistent IT concept were discussed in depth during the workshop, which was organized by the work group "Computer Science and Third World" of the Gesellschaft für Informatik e.V. Prof. Popal referred to a consistent IT concept as essential prerequisite for a secure and sustainable planning of the IT supply.

June 20 – 22, 2003

Conference: Basics for an Educational Strategy in Afghanistan in Berlin



The conference focused on the topics of education and reconstruction of Afghanistan, prerequisites for an educational strategy, and reports from the universities of Afghanistan. Three ministers from Afghanistan as well as the presidents from eight universities took part. The participants agreed that long-term objectives and clear strategies were necessary to transfer skills and knowledge to the Afghan people in order to enable them

to live an individual and social life.

The educational development needed to take into account political and social subjects, the strengthening of women's education, and the creation of infrastructural prerequisites. It was also understood that existing functionalities should be used in Afghanistan for the employment of information technologies and for the rebuilding of academic structures by means of strategic education and management.

March 22 – 26, 2004
Afghanistan Week in Berlin



High representatives from the Afghan government and Afghan universities, representatives from German governmental and non-governmental organizations as well as Afghans who lived in exile participated in this five-day event to discuss in detail the special issues of the reconstruction process in Afghanistan in the area of higher education. The main topics were:

- education and further training
- security and agriculture
- economy and technology
- development and cooperation
- culture and society

September 29, 2004
Workshop: IT Strategy by the Example of Afghanistan in Ulm



Considering it the most important prerequisite for a sustainable and functioning IT supply at Afghan universities, this workshop dealt with the urgent need to develop a national IT strategy for Afghanistan. Among the invited guests were the heads of the IT Department at the Ministry of Communication and at the Ministry of Higher Education in Afghanistan as well as three representatives from other Afghan higher education institutions.

February 15 – 17, 2005
IT Conference Part I: IT Concept for the Ministry of Higher Education in Kabul



This workshop was organized on the basis of the results of the workshop "IT Strategy by the Example of Afghanistan" during the annual meeting of the Gesellschaft für Informatik e.V. (German Informatics Society) on September 24, 2004. Together with representatives of Afghan universities and the MoHE the following fields of activities were discussed. The MoHE and all universities in Afghanistan are in need of modern

administrative structures including information and communication technologies. These shall supplement and replace the traditional and time-consuming procedures. In addition, each university was asked to elect an IT representative who manages all needs and the IT supply. They should then discuss their plans and needs with the IT Department of the MoHE.

July 1 – 3, 2005

Workshop: Academic Reconstruction in Afghanistan – Achievements and Perspectives in Berlin



After three years of reconstruction work in the Afghan academic sector, this conference aimed to draw interim results that would depict all achievements and show the possible options for continuing the reconstruction process with special attention to sustainability.

Among the participants were the Minister for Higher Education in Afghanistan, the Afghan Ambassador to Berlin and presidents from

Afghan universities. The delegation from Afghanistan was briefed on the German contribution to the reconstruction process in Afghanistan. The overall objective of the discussion was to facilitate the dialog between all involved parties and to reassure the continuation of all reconstruction measures in mutual agreement. All participants agreed that international partnerships between universities were crucial to the further academic reconstruction in Afghanistan.

July 24 – 26, 2005

Workshop: IT Infrastructure in Afghanistan in Herat



In this workshop, representatives from Afghan universities, the MoHE and international guests talked about necessary measures to establish IT infrastructures at Afghan universities. The discussion included topics like power supply, Internet access, construction measures, IT centers, PC labs for the faculties, universitywide networks, and specialized libraries for computer

science.

November 8 – 10, 2005
Workshop: IT Security in Balkh



Representatives from the most important universities in Afghanistan were invited to participate in this workshop in order to gather and exchange information about IT security issues in Afghanistan. Up until then, a general understanding of IT security issues and requirements had mostly been lacking in Afghanistan, although its relevance is of increasing importance

which is due to the growing number of PCs and computer networks throughout the country. A special focus of the discussion lay on the implementation of Open Source solutions to increase IT security. Furthermore, it became clear that IT security needed to become part of the computer science curriculum. At the end of the workshop, CD ROMs with samples of Open Source software were distributed to all participants.

November 11-13, 2006
IT Conference Part II: IT Situation at Afghan Universities in Kabul



During this conference all presidents of the Afghan universities presented the situation of their IT equipment and computer science. The conclusion to be drawn from the conference is that after more than 20 years of war and civil war in Afghanistan, most of the universities and teaching establishments in the

country have been destroyed and the academic structures are barely efficient. Universities cannot fulfill their responsibility to society alone; there is no university that has functioning IT structures:

- There are no concepts for IT networks of the individual faculties, subject areas, computer centers, PC pools of the faculties, lecture halls, seminar and administration rooms, libraries and other rooms such as student dormitories.
- Hardly any university has a stable power supply.
- The main problem faced by universities is the lack of teaching staff in the IT sector.
- IT is not taught according to international standards. There is no uniform curriculum for IT.
- IT is not used in administration at any university.

In order to improve this situation in the long term and to support Afghanistan in rebuilding higher education, the Afghan universities need modern, solid and standardized IT structures.

They must be established across the whole country and be able to convey skills and knowledge for a functioning and modern education system in Afghanistan.

February 10 – 11, 2007

Workshop: Berlin Dialogue – A Bridge between Germany and Afghanistan in Berlin

Within the scope of a winter academy, 18 Afghan students participated in an education program at the TU Berlin. The Afghan Embassy in Berlin and the Ziik wanted them to meet with Afghan-German students from German universities to see whether both groups could collaborate in the future on their own. In the end, the participants decided to develop a platform that could help intensify the future cooperation.

September 1.09 - 2.09, 2007

IT Conference Part III: Development of IT structures in Afghanistan in Kabul



The invited speakers came from the fields of universities and business. Speakers from Germany reported on their experiences. It was noted that many IT pilot projects are currently being carried out in the various areas of higher education. The universities have received financial support, hardware and training offers from UNESCO, USAid, NATO, DAAD from India, Japan,

Korea, China, the USA, Spain, Germany and France. The World Bank and a large number of foreign universities and international organizations would like to support the use of IT at Afghan universities with further IT projects. The coordination of future, international IT projects requires quality assurance and sustainability. Therefore, these projects should be bundled. The international donors should coordinate the fields of activity with one another and orient them according to the needs of the universities. To this end, an IT advisory board must be established that clearly defines the role of donors, sponsors and recipients of future projects.

August 28, 2008

Symposium: Sustainable and Secure IT Supply for the Area of Higher Education in Afghanistan in Berlin



Within the scope of this symposium, Prof. M. Osman Babury, Deputy Minister for Higher Education in Afghanistan, was invited to TU Berlin to make an overall assessment of the development of IT structures at Afghan universities from 2002 onwards. Prof. Babury pointed out that though progress could be clearly identified, still there were great deficits that needed to be addressed, especially with regard to power supply, Internet access and education

of qualified and competent personnel. He added that a reliable and sustainable IT supply needed to be backed by a consistent IT strategy and its implementation.

In the second section, the international IT conferences that we have organized annually in Afghanistan since 2008 are presented in detail. Participants included representatives from the Afghan government, including H.E. President Dr. Ashraf Ghani, H.E. the First Lady of Afghanistan, Ms. Rula Ghani, as well as ministers of higher education and communication, presidents and representatives of all public and private Afghan universities, deans of the faculties of computer science, representatives of donor organizations such as the German embassy, the DAAD, the World Bank, German universities, international GOs and NGOs as well as private companies from Afghanistan and other countries.

Second section
Presentation of the IT conferences in Afghanistan
2008-2021

November 3 – 5, 2008

IT Conference Part IV in Kabul

Conference topic: IT Strategy for Higher Education and IT Curriculum

Day 1: November 3, 2008

Welcome and Opening



at all major Afghan universities, which will give the young talents in Afghanistan a professional perspective.

The conference was opened by **Dr. Azam Dadfar**, Minister of Higher Education. The minister welcomed all participants of the conference and thanked the German Embassy and the German institutions, especially DAAD and TU Berlin for their lasting support and engagement in Afghanistan. He highlighted the importance of IT in the section of higher education, because it is a discipline that affects all other scientific fields. Therefore there is a need to establish faculties of Computer Science



software and the software is generated in the heads of people. Dr. Buck reminds that the job of the representatives from universities and the ministry is not only to teach IT, but to develop a national IT strategy. He feels impressed by the leadership of the MoHE and the heads of the universities in this field and is proud to be partners through Dr. Peroz. Afghanistan is striving to the highest standards and Dr. Buck is pleased that Germany, especially TU Berlin and DAAD are able to help here and is thanking these organizations for their work.

Words of greeting were addressed by **Dr. Christian Buck**, Deputy Ambassador of the German Embassy in Kabul. Dr. Buck reflected, that when thinking about reconstruction, we often think about bridges, schools, water supply, education – the basic infrastructure.

But today's topic, IT, takes it one step further. IT is the cutting edge of higher education and it connects any country to the rest of the world, so through IT Afghanistan can get new opportunities from a globalized world. IT is not only about hardware and technology, it is about

Keynote speeches

National IT Strategy for Higher Education

Prof. M. Osman Babury, Deputy Minister of Higher Education for Academic Affairs



Prof. M. Osman Babury began his presentation of the National IT Strategy for Higher Education by highlighting the vision of facilitating the development of Afghanistan's capital by providing access to quality higher education and enabling the people of Afghanistan to participate and effectively contribute in the development of economic growth and stability of the country. He concretized that until 2020 all Afghan institutes in the higher education sector shall have access to the international knowledge society and adoption of various measures for capacity building shall be applied. Each member of the Afghan institutes of higher education

(professors, personnel, students) as well as all employees at the MoHE shall be literate in operating IT systems and their applications. IT shall be implemented professionally for teaching, research and administration. Specific goals within this vision are quality improvement and the establishment of a Quality Assurance System, systemic reform and management improvements, access to higher education, and financing. Prof. Babury points out that in public universities currently there are five departments and one faculty of Computer Science, whereas private institutions can count on six faculties of Computer Science. Overall the biggest challenge is the insufficiently qualified teaching staff, the deficiency of IT infrastructure, and the lack of a coherent IT curriculum.

The National IT Strategy for Higher Education defines an action plan that defines the next steps to take in order to achieve the aforementioned goals, this plan includes:

- establishment and expansion of an efficient infrastructure,
- development of networks integrating all the institutes under higher education,
- establishment of computer centers in each institute of higher education,
- establishment of Computer Science faculties,
- establishment of Computer Science libraries,
- implementation of IT application in education and administration, and
- education through further training.

Strengthening the IT department of the MoHE is necessary for realizing this action plan.

The IT department will be supported by an IT board which will be formed in order to develop IT policies and strategies. The IT board will consist of members from Afghan ministries, public and private institutes of higher education, as well as international members from universities and donor organizations. Further parts of the realization of the action plans are the setup of an IT office at each university, the elaboration of a security concept, and a coordinated financial concept.

Current situation of IT in Higher Education, Mr. Salim Saay
Head of IT Department, MoHE



Mr. Salim Saay emphasized that his presentation on the current situation of IT in higher education in Afghanistan will look at the educational part as well as the technical part. In IT education there is a differentiation needed between capacity building and teaching Computer Science within a faculty or department. Computer Science Departments currently exist at Kabul University, Kabul Educational University, Kabul Polytechnic University, Nangarhar University, and Sheshk Zayed University. The only public university with a Computer Science Faculty is Herat University. So far, all these universities are teaching different curricula within their Computer Science study programs. These curricula have been

developed with the help of TU Berlin, UWC, Merlynd University, Colgate University, Delhi University, and Cisco. In addition to these curricula, the private higher education institutes have implemented their own Computer Science curricula. The need for a standardized national curriculum for Computer Science becomes obvious.

Looking at the capacity building, there have been numerous efforts in the past to train students, lecturers, and administrative staff at the universities. These efforts include the IT Center of Kabul University (ITCK), the Women Computer Center, the Angel centers, the HEP projects, Cisco projects, and computer training at the MoHE.

Mr. Saay continues to inform about the technical issues regarding IT in higher education, which include secure domains, web filtering, user acceptable policies, a student information system, a concours database, and firewalls. In 2008, the IT department of MoHE has made inventory checks and assessments of available IT infrastructure at all universities.

Framework for the implementation of IT in the area Higher Education in Afghanistan

Dr. Nazir Peroz, Head of the ZiiK at the TU Berlin



Dr. Nazir Peroz outlined the framework that is necessary to implement IT in the area of higher education in Afghanistan.

Prerequisites of IT in higher education are a legal framework, which is supported from the political, economic, and societal stakeholders and brought into agreement with the IT strategy of the Ministry of Communication.

Regarding the *political frame*, Afghanistan needs an IT strategy, which coheres to the national needs of Afghanistan. The rights of individuals in the use of IT have to be protected and guaranteed. National measures must be set in accordance to international IT policy.

Within the *economic frame* private initiative have to be strengthened, the setting up of business

facilitated and the flexibility of the overall economy towards technical and economical developments enlarged.

The *societal frame* includes the facilitation of a low-cost IT access. The Afghan government on the other hand must ensure to prevail against criminal content and prevent to development of a new kind of criminality. Legislative framework conditions must be established regarding youth protection, copyright, data privacy, etc.

The MoHE will consider *organizational and technical measures* on how the resource demand at each faculty can be determined, the priority of projects can be defined, programs of action can be established, a time schedule can be set up, and measurements within the action plan can be coordinated between donor countries, supporters and recipients.

An important organizational measure consists in the founding of a *CIO* (Chief Information Officer). The tasks of this organization divide into three categories:

- Lead and conduct: Publish project ideas, determine the need of the universities, fill donors with enthusiasm, and prepare decisions.
- Coordination: Design and organize the project frame, connect interests, mediate between stakeholders, preserve continuity, positively affect the climate, think sustainably.
- Observe and judge: evaluate, monitor quality standards, give feedback, reflect, document.

The *activity fields* of the action plan include the *construction and expansion of an efficient IT infrastructure*. The deployment of productive local computer systems, standardized office and administration software as well as network based communication forms at universities depends on an efficient infrastructural basis, such as power supply, buildings suitable for IT, and personnel that is capable of operating it. For the solution that will be implemented a time frame of three years is considered for the establishment of an extensive power supply that is not dependent on generators, as well as telephone connections, communication channels or broad-band cables.

Another action field is the establishment of *IT centers at the universities*. IT centers form the heart of a university network and make fundamental services and resources available. These services include the *development of an e-mail system*. Furthermore *network connections* within universities, faculties and administrations and with each other must be established.

Libraries and buildings with a high percentage of IT supported lectures must be equipped with a wireless network. Internet access must be facilitated. The use of *open source software* should be encouraged.

IT in administration can be a promoter of reforms. This will speed up the work flow at all administrative levels, provide access to information, knowledge and processes, raise efficiency through the use of databases and libraries, give everyone access to administration services with lower waiting times, and make decisions faster and more transparent.

University employees have a great demand for *further education*. Education programs must be designed in a way to make university members (professors, lecturers, administrative employees, and students) capable of operating computers, administrate networks, and find solutions for occurring technical problems. Besides the technical knowledge, aspects of *data privacy and data security* need to be taught.

The current lack of qualified IT personnel is based on the insufficient opportunities of education during the years of war. The initiative of the *construction of computer science faculties* should provide this opportunity in an extensive way. The project should be started immediately and until the year 2016 all Afghan universities should have a computer science faculty. A coherent national IT curriculum is necessary at these faculties.

The projects within the action plan must be strategically planned and coordinated by the MoHE and the exchange of information and cooperation between government institutions and the universities must be ensured. The universities will have to learn in a collaborative manner, including joint research projects and the operation and use of shared infrastructure. The cooperation at international level is recommended on department level.

A *steering group* for the coordination of the "Action Plan MoHE 2008-2020" with donor countries, supporters and recipients must be formed in order to provide quality, sustainability, compatibility, security, and bundling of resources.

In respect to the welcoming speech of Minister Dr. Dadfar and the presentation of Deputy Minister Prof. Babury, who both laid out the need of the foundation of Computer Science faculties in the major universities to give the motivated youth a career perspective, Dr. Peroz recommended the following: Regarding the current goals of the MoHE and given the current deficit of qualified personnel, technical equipment, and administrative structures it is necessary to bundle existing resources in order to build up academic structures rapidly.

An effective use of the IT strategy plan of the MoHE can be ensured by establishing an independent IT Institute in Kabul. This bundling of resources will ease coordination and give financial advantages. Within this structure efficient and sustainable teachings and research can be established at an internationally acknowledged level. The institute would provide a scientific home for the twelve lecturers from Kabul who are currently studying in a Master program at TU Berlin that is financed by the World Bank and who will push forward the establishment of IT structures in the academic field after completing their studies.

Development of an IT Curriculum, Dr. Jochen Koubek,
Humboldt University Berlin



Dr. Jochen Koubek, who has been actively involved in the design of curricula in computer science in Germany, presented the steps that are necessary to take to develop a syllabus for an IT curriculum. He clarified these terms by defining a curriculum as consisting of everything that promotes learners' intellectual, personal, social and physical development. As well as lessons and extracurricular activities, it includes approaches to teaching, learning and assessment, the quality of relationships within university, and the values embodied in the way the university operates. It provides the framework for a syllabus and should focus on the people it affects. The presented guidelines for developing a syllabus were

distilled from guidelines of the Association for Computing Machinery (ACM), the Association for Information Systems (AIS), the Association of Information Technology Professionals (AITP), the Institute of Electrical and Electronics Engineers (IEEE), the German Society of Computer Science (GI), and the International Federation for Information Processing (IFIP).

The most important aspect of syllabus design is that it needs to have a real-world-basis.

An outcome focused approach looks first at what the graduates are going to do after their studies, the action fields. The learning fields should be based on these action fields and are described with competencies and content. They are concretized by learning situations which are the result of a didactical reflection of professional, individual and social action fields. Curriculum designers and instructors must think in terms of outcomes, it is not the question what the lecturers could teach, but what the students should learn. Presenting the example of a syllabus from the ACM, Dr. Koubek showed that it not only contains technological competencies, but also analytical and critical thinking, teamwork, organizational and other so called "soft" skills.

One key aspect of syllabus design is, that the underlying and enduring principles of computer science should be emphasized, rather than details of the latest or specific tools. Of course the students will know specific tools, but they are not necessarily taught at university.

Apart from university studies of computer science, there is also a need for the training of basic tools and IT skills.

As for syllabus organization it can be summarized that learning certain computer science topics requires maturity, so that these topics should be taught towards the end of the curriculum, while other material should be taught earlier to facilitate gaining that maturity. The granularity levels of design in a syllabus architecture reach from the presentation areas via courses with learning units to a detailed body of knowledge. In the design process ethical, legal, and economic concerns, and the notion of what it means to be a professional, should be raised frequently, since the curriculum is not about technology, but about people, which are designing, constructing, and using technology to help other people. They have to know more than technology, they have to know what the technology they construct is used for.

Curriculum designers must strike an appropriate balance between coverage of material, and flexibility to allow for innovation in order to cope with technological change.

Furthermore curriculum designers and instructors must have sufficient relevant knowledge and experience and understand the character of their topic. In order to ensure that students embrace certain important ideas, care must be taken to motivate students by using interesting, concrete and convincing examples. Computer science education today needs to move beyond the lecture format as teamwork and social skills cannot be learned that way: It is therefore important to encourage consideration of a variety of teaching and learning approaches.

Dr. Koubek concludes that in the 21st century Afghanistan has the opportunity to be part of the international scientific society. For achieving this goal it is crucial to have a higher education, comparable to international standards. A computer science curriculum is more than about technology, it is about principles, divided and structured into modules. The design of such a curriculum takes time and effort, but it is an investment in the future which pays off in the years to come.

Day 2: November 4, 2008

IT Curriculum Development

The second conference session focused on the development of an IT curriculum. The session was moderated by **Mrs. Melanie Stilz**, of TU Berlin.

In the first conference session it was concluded that there is a need for differentiating three types of IT education: training in basic IT skills, training in advanced IT skills for web masters and server or network administrators, and higher education in computer science programs at bachelor level.

Presentation of IT Curricula

The morning of this second day was dedicated to the presentation of different curricula that are taught or are going to be implemented at six different public and private universities of Afghanistan. The curricula presented can be found in the appendix to this document.



The curriculum of **Kabul University** was presented by **Mr. Tariq Meeran**, Assistant Professor in the Computer Science Department (see appendix 1). This department was the first Computer Science department in Afghanistan, established in 1995.



Dr. Dawlat Khan, Dean of Computer Science, presented the curricula of the bachelor programs in computer science and in telecommunication from **Bakhtar University** (see appendix 2). This private institute of higher education is situated in Kabul.



Kardan Institute of Higher Education was represented by **Mr. Irfan Khan**, Dean of Computer Science. Kardan institute is the first private institute of higher education in the country and is based in Kabul. Amongst other study programs it offers a bachelor in computer science and a diploma in information technology (see appendix 3).



Herat University is the only public university that has established a Computer Science Faculty up to now with the support of the TU Berlin. (see appendix 4). **Mr. Mahmood Asgharzada**, Local Manager of the faculty, presented the curriculum taught in Herat with help of

lecturers from TU Berlin, which will be replaced by local lecturers that are currently participating in a Master program in computer science in Berlin.



Mr. Hamdullah Mohib, Assistant Director of IT, presented the curriculum of the private **American University** in Kabul (see appendix 5). At this university it is possible to receive degrees in a study program called “Information Technology and Computer Science”.



The sixth presentation of a curriculum was conducted by **Mr. Badam**, head of the IT department of **Nangarhar University** (see appendix 6). Nangarhar University has plans to extend its Department of Computer Science to a faculty with departments of networking, software engineering, as well as database in the near future.



Apart from the education in computer science, there is a huge demand for further education of university personnel. A concept for the first type of IT education was presented by **Mr. Tasali**, head of the **IT Center at Kabul University (ITCK)**.

The **Basis IT Training at Universities** has been successfully conducted by ITCK staff in the last years. Since 2003 ITCK is providing this basic IT training for university members (professors, lecturers, administrative employees, and students). There is a specific syllabus for each of these target groups.

Since 2006 the focus of education at ITCK has concentrated on the education of IT administrators for all faculties of Kabul University. This kind of education differs from the more scientific education of Computer Science.

Working Groups

After the presentation of six syllabuses by public and private universities in the morning, the second part of the day was dedicated to address the necessary steps that are taken in order to develop a curriculum. For this purpose the 60 conference participants were divided into three working groups which were independently going through the curriculum development process and thereby identifying the essential elements of a national IT curriculum. All members of one university were together in the same working group. Each working group had about 20 participants.



and **Mr. Hassan Adelyar** (Kabul University).

The first working group was lead by **Dr. Jochen Koubek** (Humboldt University Berlin) and **Mr. Irfan Khan** (Kardan Institute of Higher Education).

The work of the second working group was moderated by **Mr. René Herlitz** (TU Berlin)



Berlin) and **Mr. Salim Saay** (MoHE).

The third working group was organized by **Mrs. Melanie Stilz**, **Mrs. Lena Wittke** (both TU



The division into working groups made a clear and structured discussion of the curriculum development process possible. In each working group the same catalog of eight predefined questions was answered independently. These eight questions reproduced the curriculum design process:

1. **Resources:** What preliminaries are necessary for teaching computer science at university level?
2. **Action fields:** What are the jobs that computer science graduates are going to work in in the future?
3. **Competencies:** What competencies are necessary in order to work in the action fields identified in the previous step?
4. **Principles:** What principles of computer science are related to the competencies identified in step 3?

5. **Modules:** How can we group these principles into modules? Which modules cover the intended objectives?
6. **Number of semesters:** How many semesters are needed to cover the identified modules?
7. **Distribution of modules:** How do distribute the chosen modules into the semesters available?
8. **Next steps:** What are the next steps that are necessary for the deployment of the developed curriculum?

In all three working groups the discussions were lively and productive. The results were presented on the following day.

Day 3: November 5, 2008

Discussion

The aim of the final session of this year's conference on IT in higher education was the presentation of the outcomes and the discussion of the results from the working groups that would lead to a conclusion of the next steps to take. The session was moderated by **Prof. Babury** and **Dr. Peroz**.



Mr. Salim Saay, Head of IT Department of MoHE, started the morning session with the presentation of the results from his working group. This working group chose to work on the action fields website design, database development, network administration, and software engineering. The elements that were identified in each step were presented.



The results of the second working group were presented **Mr. Hassan Adelyar**, Computer Science Lecturer at Kabul University. A presentation of the step-by-step process from prerequisites and action fields via competencies and principles to modules was presented. One of the findings of this working group was the consideration that students enter Afghan universities with differing levels of IT literacy, which can be as low as none. In order to encounter this problem, the first semester must be dedicated to teaching the basic prerequisites of Computer Science. In the working group it got clear that curriculum development is an effort that takes several weeks to provide sustainable outcomes. Therefore it was suggested to form a Curriculum Development Team in which representatives of MoHE and the universities work together in the planning of financial resources, a curriculum framework (study and exam regulations), and a syllabus (module definition and descriptions).



Findings of the remaining working group were presented by **Mr. Irfan Khan**, Dean of the Department of Computer Science at Kardan Institute of Higher Education. Again the step-by-step process was shown and the result was similar to the other two working groups. One of the considerations by this working group, was the structuring of the modules into the semesters. It was proposed to start with a pillar based approach in the first four to six semesters and afterwards provide action field orientated modules. Mr. Khan furthermore

pointed out that currently there are 25 computer science lecturers in Berlin studying in a Masters program.

Since they are going to teach the future curriculum, they should be involved in the development process.

Conclusion

During the presentation of the working group results it got clear that a consensus among the participants existed on many aspects of a computer science curriculum. These aspects were summarized by the session moderators.

The action fields identified had in common that they were working on practical issues of computer science. One of the important findings were that the competencies that graduates should have are not only of technical background, but also include general competencies such as social and team skills, interpersonal communication, English language, and the ability of making ethical considerations.

Further it was common understanding that the duration of a Bachelor program in computer science should be eight semesters where the first semester should be reserved for the prerequisites that are needed to study computer science and the eighth semester is mainly being used for preparing the bachelor thesis.

The process of developing a national IT curriculum will involve a major effort in time and personnel. The suggestion of forming a round table for curriculum development was well received it was highlighted as the next step to take subsequent to the conference.

Dr. Peroz welcomed the idea of the second working group of forming a working group for curriculum development. He summarized that action has to be taken quickly in order to educe the lack of qualified personnel and orientate teachings and research on the needs of the country. Three types of education in IT can be differentiated:

- 1) Basic IT education that teaches the use of the new technologies for everyday work.
- 2) Higher level IT education for the overall technical, economic, and administrative development of the university. Target groups are IT managers, IT administrators, IT technicians, IT web master, etc.

- 3) Regular computer science study programs on a high quality level that is adjusted to international standards in order to form and support the young talent in science and research and for the formation of experts for leading roles of the country.

The Afghan universities must aim for an integration into the international scientific community as acknowledged members. The curriculum under development must consider the needs of Afghanistan, the resources available and the education level of the students.

The participants appraised the outcome of the conference as a success. The findings provide a solid starting point for a national curriculum development process for bachelor studies in computer science. The proposed round table needs to be formed quickly while the motivation generated in the conference is still fresh. It should be headed by a representative named by the MoHE. Further participants should be composed by international experts as well as national experts of the major higher education institutions which will implement the curriculum in the future. All members of the round table should have an overview of the field of computer science and be directly related to a department or faculty of computer science at the respective universities. During the selection of round table members the MoHE should propose a time line and a list of expectations for the work of the group.

Prof. Babury appreciated this initiative of forming a round table for developing a national IT curriculum for Afghanistan and assured his support in its establishment.

As was concluded from the conference, the development process of a national curriculum involves the following steps:

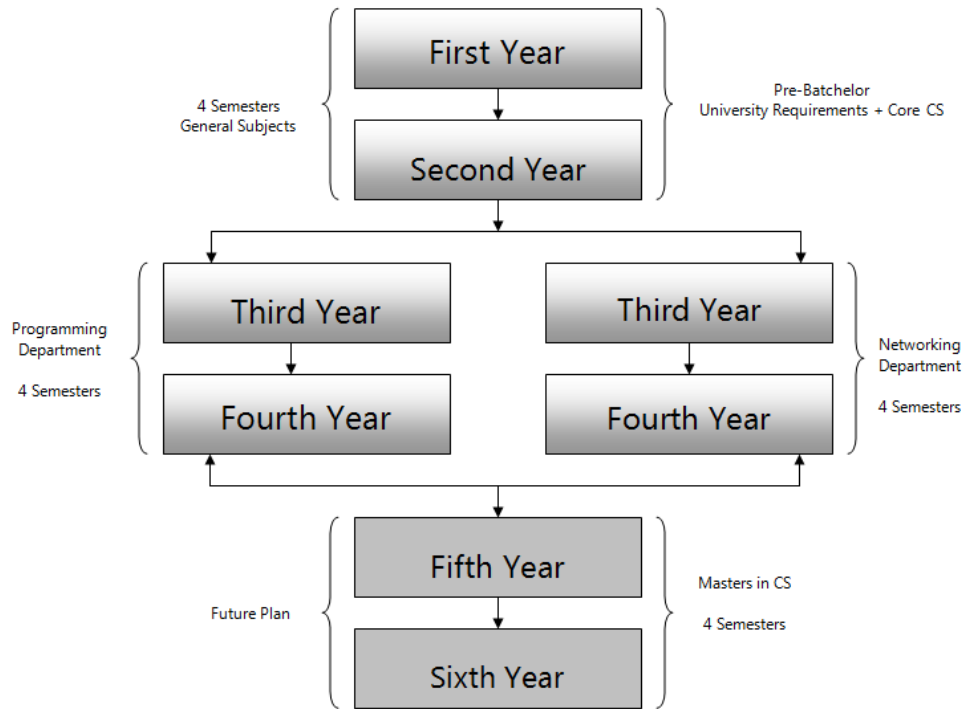
- Analysis of the demand of the Afghan labor market and definition of the short, middle, and long term education demand according to the outcome.
- Determination of the personnel, technical, and financial resources necessary for the realization of a coherent curriculum.
- Selection of national and international partner organizations and universities and establishment of a coordinating instance.
- Ascertainment of the measures in an action plan with an according time schedule.
- Definition of study courses and creation of a syllabus for each semester, and description of the content of the individual courses.
- Evaluation of the course content by computer science experts and further development of study structure and content according to the changing demand.

Dr. Peroz thanked the MoHE for hosting the conference, the Afghan university representatives for taking the time to join the event, and the German Embassy and DAAD for their support as well as Mrs. Melanie Stilz and Mr. Salim Saay for the preparation and organization of the conference. **Prof. Babury** expressed his thanks towards the representatives of TU Berlin and Humboldt-University Berlin for their input and their continuous support for IT in higher education in Afghanistan. Furthermore he thanked the DAAD for financing such an important event and the university representatives for taking the time to discuss the future of IT in higher education in Afghanistan.

Appendices – IT Curricula presented on Day 2

Appendix 1 – Kabul University

Proposed structure:



1st Semester

| Course ID | Course Name | Hours L-P* | Marks |
|---|--|------------|-------|
| CS101 | Introduction to Computers and Networks | 3-0 | 100 |
| <i>(Other courses as per common curriculum)</i> | | | |

2nd Semester

| Course ID | Course Name | Hours L-P* | Marks |
|---|---------------------------------------|------------|-------|
| CS201 | Introduction to Common Software Tools | 3-0 | 100 |
| <i>(Other courses as per common curriculum)</i> | | | |

3rd Semester

| Course ID | Course Name | Hours L-P* | Marks |
|-----------|---|------------|-------|
| CS301 | Programming and Problem Solving with Computer | 3-0 | 100 |
| CS302 | Computer System Organization | 3-0 | 100 |
| CS303 | Digital Electronics | 3-0 | 100 |
| CS304 | Computer Networks – I | 3-0 | 100 |
| CS305 | Advanced Calculus | 3-0 | 100 |
| CS306 | Lab based on CS301, CS302, CS303, CS304, and Software Tools | 0-8 | 100 |

4th Semester

| Course ID | Course Name | Hours L-P* | Marks |
|-----------|---|------------|-------|
| CS401 | Data Structures and File Systems | 3-0 | 100 |
| CS402 | Mathematical Foundations of Computer Science | 3-0 | 100 |
| CS403 | Microprocessors and Assembly language Programming | 3-0 | 100 |
| CS404 | Computer Networks – II | 3-0 | 100 |
| CS405 | Algebra | 3-0 | 100 |
| CS406 | Lab based on CS401, CS402, CS403, CS404, and Software Tools | 0-8 | 100 |

5th Semester

| Course ID | Course Name | Hours L-P* | Marks |
|-----------|--|------------|-------|
| CS501 | Object Oriented Programming | 3-0 | 100 |
| CS502 | Database Systems | 3-0 | 100 |
| CS503 | Analysis and Design of Algorithms | 3-0 | 100 |
| CS504 | Numerical and Scientific Computing | 3-0 | 100 |
| CS505 | Probability Theory | 3-0 | 100 |
| CS506 | Lab based on CS501, CS502, CS504, and Software Tools | 0-8 | 100 |

6th Semester

| Course ID | Course Name | Hours L-P* | Marks |
|-----------|---|------------|-------|
| CS601 | Operating Systems | 3-0 | 100 |
| CS602 | Software Engineering | 4-0 | 100 |
| CS603 | Principles of Visual Programming | 3-0 | 100 |
| CS604 | Internet and Web Technologies | 3-0 | 100 |
| CS605 | Statistics | 3-0 | 100 |
| CS606 | Lab based on CS601, CS602, CS603, CS604, and Software Tools | 0-8 | 100 |

7th Semester

| Course ID | Course Name | Hours L-T-P* | Marks |
|-----------|---|--------------|-------|
| CS701 | Computer Graphics | 3-0 | 100 |
| CS702 | Theory of Computation | 3-0 | 100 |
| CS703 | Programming Languages and Paradigms | 3-0 | 100 |
| CS704 | Technical Communication | 3-0 | 100 |
| CS705 | Elective – I | 4-0 | 100 |
| CS706 | Lab based on CS701, CS703, CS704, CS705, and Software Tools | 0-8 | 100 |

8th Semester

| Course ID | Course Name | Hours L-T-P* | Marks |
|-----------|---------------------|--------------|-------|
| CS701 | Intelligent Systems | 3-0 | 100 |
| CS702 | Elective – II | 4-0 | 100 |
| CS703 | Elective – III | 4-0 | 100 |
| CS704 | Project | 0-8 | 100 |

Appendix 2 – Bakhtar University

SEMESTER-I

| Course Code | Course Title | Credit Hours |
|--------------------|--------------------------------|---------------------|
| BCS111 | IT Essentials | 3 |
| BCS112 | Mathematics-I | 3 |
| BCS113 | Probability & Statistics | 3 |
| BCS114 | Functional English | 3 |
| BCS115 | Financial Accounting | 3 |
| BCS116 | Programming Languages –I | 3 |
| | TOTAL SEMESTER CRED HRS | 18 |

SEMESTER-II

| Course Code | Course Title | Credit Hours |
|--------------------|-------------------------------------|---------------------|
| BCS117 | Programming Languages-II | 3 |
| BCS118 | Mathematics-II | 3 |
| BCS119 | Digital Logic Design | 3 |
| BCS120 | Operating Systems | 3 |
| BCS121 | Technical & Business Writing | 3 |
| BCS122 | Afghanistan Studies/Islamic studies | 3 |
| | TOTAL SEMESTER CRED HRS | 18 |

SEMESTER-III

| Course Code | Course Title | Credit Hours |
|--------------------|---|---------------------|
| BCS123 | Database-I | 4 |
| BCS124 | Object Oriented Programming-I | 3 |
| BCS125 | Computer Graphics | 4 |
| BCS126 | Discrete Mathematics | 3 |
| BCS127 | Computer Architecture/Assembly Language | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

SEMESTER-IV

| Course Code | Course Title | Credit Hours |
|-------------|----------------------------------|--------------|
| BCS128 | Data Communications & Networking | 3 |
| BCS129 | Data Structures & Algorithms | 4 |
| BCS130 | Analysis of Algorithms | 4 |
| BCS131 | Artificial Intelligence | 3 |
| BCS132 | Advance DBMS | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

SEMESTER-V

| Course Code | Course Title | Credit Hours |
|-------------|----------------------------------|--------------|
| BCS128 | Data Communications & Networking | 3 |
| BCS129 | Data Structures & Algorithms | 4 |
| BCS130 | Analysis of Algorithms | 4 |
| BCS131 | Artificial Intelligence | 3 |
| BCS132 | Advance DBMS | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

SEMESTER-VI

| Course Code | Course Title | Credit Hours |
|-------------|----------------------------------|--------------|
| BCS128 | Data Communications & Networking | 3 |
| BCS129 | Data Structures & Algorithms | 4 |
| BCS130 | Analysis of Algorithms | 4 |
| BCS131 | Artificial Intelligence | 3 |
| BCS132 | Advance DBMS | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

SEMESTER-VII

| Course Code | Course Title | Credit Hours |
|-------------|----------------------------------|--------------|
| BCS128 | Data Communications & Networking | 3 |
| BCS129 | Data Structures & Algorithms | 4 |
| BCS130 | Analysis of Algorithms | 4 |
| BCS131 | Artificial Intelligence | 3 |
| BCS132 | Advance DBMS | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

SEMESTER-VIII

| Course Code | Course Title | Credit Hours |
|--------------------|----------------------------------|---------------------|
| BCS128 | Data Communications & Networking | 3 |
| BCS129 | Data Structures & Algorithms | 4 |
| BCS130 | Analysis of Algorithms | 4 |
| BCS131 | Artificial Intelligence | 3 |
| BCS132 | Advance DBMS | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

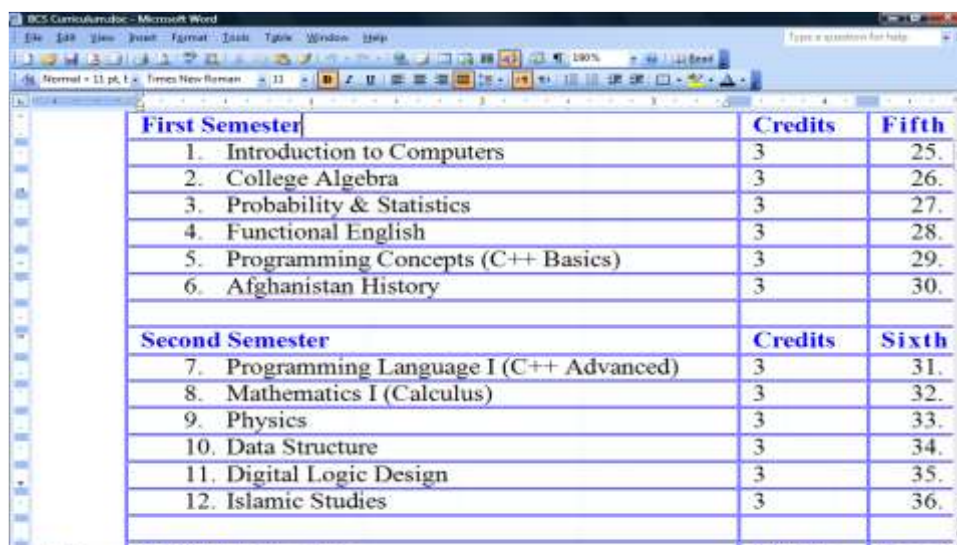
| Course Code | Course Title | Credit Hours |
|--------------------|----------------------------------|---------------------|
| BCS133 | Wireless & Mobile Communications | 3 |
| BCS134 | Software Engineering-I | 3 |
| BCS135 | Theory of Automata | 4 |
| BCS136 | Object Oriented Programming-II | 4 |
| BCS137 | Database Administration | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

| Course Code | Course Title | Credit Hours |
|--------------------|--------------------------------|---------------------|
| BCS138 | E-Commerce | 4 |
| BCS139 | Web Development | 3 |
| BCS140 | Communication Skills | 3 |
| BCS141 | Visual Programming-I | 4 |
| BCS142 | Multimedia Technologies | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

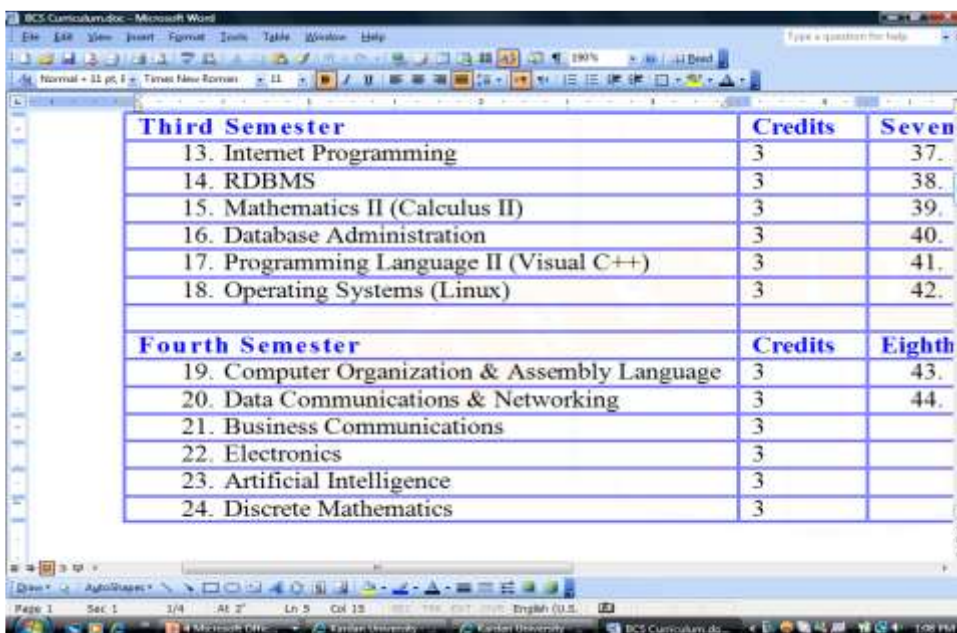
| Course Code | Course Title | Credit Hours |
|--------------------|--------------------------------|---------------------|
| BCS143 | Visual Programming-II | 4 |
| BCS144 | Advanced Networking | 4 |
| BCS145 | Research methodology | 3 |
| BCS146 | Management Information System | 3 |
| BCS147 | Decision Support System | 3 |
| | TOTAL SEMESTER CRED HRS | 17 |

| Course Code | Course Title | Credit Hours |
|-------------|--------------------------------|--------------|
| BCS148 | Software Engineering-II | 4 |
| BCS149 | System Programming | 4 |
| BCS150 | Research Project | 9 |
| | TOTAL SEMESTER CRED HRS | 17 |

Appendix 3 – Kardan Institutes of Higher Education



| First Semester | | Credits | Fifth |
|------------------------|---------------------------------------|----------------|--------------|
| 1. | Introduction to Computers | 3 | 25. |
| 2. | College Algebra | 3 | 26. |
| 3. | Probability & Statistics | 3 | 27. |
| 4. | Functional English | 3 | 28. |
| 5. | Programming Concepts (C++ Basics) | 3 | 29. |
| 6. | Afghanistan History | 3 | 30. |
| Second Semester | | Credits | Sixth |
| 7. | Programming Language I (C++ Advanced) | 3 | 31. |
| 8. | Mathematics I (Calculus) | 3 | 32. |
| 9. | Physics | 3 | 33. |
| 10. | Data Structure | 3 | 34. |
| 11. | Digital Logic Design | 3 | 35. |
| 12. | Islamic Studies | 3 | 36. |



| Third Semester | | Credits | Seventh |
|------------------------|---|----------------|----------------|
| 13. | Internet Programming | 3 | 37. |
| 14. | RDBMS | 3 | 38. |
| 15. | Mathematics II (Calculus II) | 3 | 39. |
| 16. | Database Administration | 3 | 40. |
| 17. | Programming Language II (Visual C++) | 3 | 41. |
| 18. | Operating Systems (Linux) | 3 | 42. |
| Fourth Semester | | Credits | Eighth |
| 19. | Computer Organization & Assembly Language | 3 | 43. |
| 20. | Data Communications & Networking | 3 | 44. |
| 21. | Business Communications | 3 | |
| 22. | Electronics | 3 | |
| 23. | Artificial Intelligence | 3 | |
| 24. | Discrete Mathematics | 3 | |

| Fifth Semester | | Credits |
|-----------------------|---|----------------|
| 25. | Programming Language III (OOP Via JAVA) | 3 |
| 26. | Software Engineering I | 3 |
| 27. | Digital Image Processing | 3 |
| 28. | Computer Architecture | 3 |
| 29. | Compiler Construction | 3 |
| 30. | Computer Graphics | 3 |
| Sixth Semester | | Credits |
| 31. | ASP.NET | 3 |
| 32. | Multimedia Technology | 3 |
| 33. | VB.NET (Basic) | 3 |
| 34. | Elective I | 3 |
| 35. | Elective II | 3 |
| 36. | Elective III | 3 |

| Seventh Semester | | Credits |
|-------------------------|--------------------|----------------|
| 37. | VB.NET (Advanced) | 3 |
| 38. | Numerical Analysis | 3 |
| 39. | Elective IV | 3 |
| 40. | Elective V | 3 |
| 41. | Elective VI | 3 |
| 42. | Elective VII | 3 |
| Eighth Semester | | Credits |
| 43. | Thesis | 6 |
| 44. | Internship | 6 |
| | | |
| | | |

Appendix 4 – Herat University

1st semester:

- Introduction to Programming I (Intro to Programming, JAVA, ToP, Variable Concepts, Data Types, Control Flow, Concept of Algorithms, data structures, methods, OOP)
- Introduction to Computer Science I (Intro to CS, Comp HW, Data Format and sizes, Internet, Office, Intro to Linux)
- Introduction to Mathematics I (Recover all math fundamentals, Number Systems, set of #, Theory of sets, arithmetic, equations and inequations, functions, intro to Algebra and analysis)
- English I (CS is mainly in English)
- Islamic

2nd semester:

- Introduction to Programming II (Continue Java, OOP, Data Structures, Search Algorithms, Practical work (Exercise))
- Introduction to Computer Science II (Intro to CS, Computer Arithmetic and Electronics – HW system Architecture, RISC, CISC, Machine Lang, Boolean Logic, Logic gates, digital circuits (Hamming code, information, redundancy))
- Introduction to Mathematics II (Recover all math fundamentals, Number Systems, set of #, Theory of sets, arithmetic, equations and inequations, functions, intro to Algebra and analysis)
- English II (CS is mainly in English)
- Islamic

3rd semester:

- Technical Computer Science I (OS in Focus, deals with main concepts of modern OSs, File and Process management)
- Computer Science I (Intro to SE, examples are used to show how to identify relevant parts of SW project descriptions, UML to create models of example SW projects)
- Introduction to Mathematics II (main topics inside calculus, Limit of functions, derivatives, quotient, chain rule, continuity, mean value theorem, Taylor theorem.)
- English III (CS is mainly in English)
- Islamic

4th semester:

- Technical Computer Science II (networking system on focus, theory and practice of Computer Network)
- Computer Science II (continue from last semester, SE, UML,)
- Mathematics II (Continue from Last semester)
- English IV
- Islamic

5th semester:

- Technical Computer Science III (Intro to DB, focus on relational databases, the concept, design and implementation)
- Computer Science III (Shows New way into JAVA, using swing and awt packages (GUI), get overview of SDK)
- Mathematics III (DMs, Combinatorics, theory of computation, and graph theory)
- Management (Intro to how org and management works. Group work for projects in work environments)
- Scientific Writing (Overview, read and interpret, Keywords recognition, different scientific texts)
- Seminar
- Islamic

6th semester:

- Computer Science in Application: Database
- Computer Science in Application: Networking
- Computer Science in Application: Software Engineering
- Computer Science in Application: CS and Society
- Seminar Scientific Writing
- English (optional)

7th semester:

- Computer Science in Application (Project)
- Computer Science in Application (Project)
- Computer Science in Application (Project)
- Scientific Writing
- Islamic

8th semester:

- Monograph
- Presentation and Defending

Appendix 5 – American University

Service Courses Required (not counted in the major credits):

MTH 115 Discrete Mathematical Structures for IT (3)

CS 101 Intro to Computers (3)

I. Overview of Courses Required in the IT major:

| | |
|---|----------|
| ITCS 115 Introduction to Information Technology (3) | 1st Year |
| ITCS 210 Computer Systems Hardware and Organization (4) | 1st Year |
| ITCS 215 Programming I (4) | 2nd Year |
| ITCS 225 Programming II (4) | 2nd Year |
| ITCS 220 Fundamentals of Networking & Telecomm (4) | 2nd Year |
| ITCS 230 Database Concepts (4) | 2nd Year |
| ITCS 310 Data Structures (4) | 3rd Year |

Plus take any three of the following:

| | |
|--|--------------|
| ITCS 320 Advanced Networking & Telecomm (4) | 3rd/4th Year |
| ITCS 330 Advanced Database Concepts (3) | 3rd/4th Year |
| ITCS 340 Human-Computer Interaction (3) | 3rd/4th Year |
| ITCS 350 Open-Source Software (3) | 3rd/4th Year |
| ITCS 410 Web Systems and eBusiness (3) | 3rd/4th Year |
| ITCS 420 Information Technology Management (3) | 3rd/4th Year |
| ITCS 430 Artificial Intelligence (3) | 3rd/4th Year |
| ITCS 490 Special / Current Topics in ITCS (3) | 3rd/4th Year |

Total: 10 courses (36 credits)

II. Overview of Courses Required in the IT minor:

| | |
|---|-----|
| ITCS 110 Introduction to Information Technology | (3) |
| ITCS 210 Computer Systems Hardware and Organization | (4) |
| ITCS 215 Programming I | (4) |
| ITCS 220 Fundamentals of Networking & Telecomm | (4) |
| ITCS 230 Database Concepts | (4) |

Total: 5 courses (19 credits)

Appendix 6 – Nangarhar University

1st semester:

Introduction to Computers

Programming concepts

Calculus- 1

Functional English

Accounting

2nd semester:

Advanced Programming in C
Discrete Mathematics
Digital Logic Design
Statistics
Calculus-2

3rd semester:

Database-I
Data Structures
Object Orientated Programming in C++
Numerical Analysis
Business Communication

4th semester:

Database-II
Data Communications
Operating Systems
Software Engineering-I
Electronics - Circuit Theory

5th semester:

Computer Architecture
Computer Networks-I
Java Programming
Software Engineering-II
Web Programming

6th semester:

Assembly Language programming
Computer Networks-II
Visual Programming
E Commerce

7th semester:

Automata Theory
Computer Graphics
Wireless and mobile Communication
Technical Report Writing
Software Project Concept

8th semester:

Compiler Construction
Software Project Management
Artificial Intelligence
Software Project Presentation

August 4 – 6, 2009

IT Conference Part V in Kabul

Conference topic: IT security for Afghanistan

Day 1: August 4, 2009

Welcome and Opening



The conference was opened by **Dr. Azam Dadfar**, Minister of Higher Education. In his welcome to all participants the minister expressed his pleasure of seeing many IT specialists participating in this fifth part of the conference series. The minister summarized the achievements made in the area of IT in the last years.

Currently many Computer Science lecturers of Afghan universities are receiving further qualification abroad. Among them 25 lecturers from 6 universities that are participating in a Master program at TU Berlin with a scholarship granted by the World Bank, 11 lecturers studying at the Technical University of Bangkok, as well as further scholarships in India and other countries. The minister thanked the DAAD, the German embassy and TU Berlin, especially Dr. Peroz, for supporting this conference as well as many other IT projects in Afghanistan. He also thanked all chancellors, lecturers and participants for joining the conference and expressed his hope that the fruits of the conference will spread to the universities throughout the country and will be applied in the reconstruction process of Afghanistan.



The second welcoming speech was held by **Mr. Amir Zai Sangin**, Minister of Communication and Information Technology. After welcoming all participants, the minister stressed the important role that IT is playing in the developing of economy, governance, business, and education. If an incident is happening today in Helmand province, the news will be spread around the world in a few seconds. IT in Afghanistan started from zero about six years ago, and there was

nothing before the mentioned period of time.

Today more than 10 million people are using mobile phones in Afghanistan and all six mobile companies of Afghanistan provide mobile Internet access as well. Currently it is estimated that 1 million people are using the Internet in Afghanistan. But unfortunately the progress of IT is not as fast as was hoped in the beginning. Since Afghanistan is a landlocked country, all Internet connections are currently going via satellite systems which are far more expensive and have a lower bandwidth. In the future Afghanistan will be connected to the neighboring countries via fiber optic, which is presently being built.

The purpose of the current conference is data security. The Ministry of Communication and Information Technology has drafted a law on IT security, which is currently being revised by the Ministry of Justice. The law contains rules for administrative staff, role definitions of the Ministry of the Interior as well as the Supreme Court regarding IT security. A team of IT experts should protect Afghanistan against illegal cyber attacks and hackers in the future. It is the responsibility of government to protect official data from unauthorized access. The minister thanked TU Berlin, the DAAD, and the MoHE for conducting this successful series of conferences on IT.



Words of greeting were addressed by his Excellency **Werner H. Lauk**, Ambassador of Germany. He was glad to see so many participants that are directly benefiting from a German-Afghan cooperation as the conference is

being jointly organized by the ZiiK of TU Berlin and the MoHE with financial support of the DAAD. The ambassador further summarized the current academic scholarships that are granted to Afghan

lecturers at different German universities. He emphasized the long tradition of academic exchange between Germany and Afghanistan and promised for a long time cooperation in the future, as Afghanistan currently needs capacity building, improvement and modernization of education. Germany is cooperating in this regard in order to motivate lecturers and students for better and brighter future.

Keynote Speech:

Aspects of Security and Measures

Nazir Peroz, director of the ZiiK of TU Berlin



Dr. Nazir Peroz thanked the ministers and the ambassador for their words of welcome. Dr. Peroz stressed the importance of securing IT in Afghanistan, as the use of this technology is growing rapidly. Concepts have to be developed in order to enhance the sensibility towards the aspects of IT security issues. Governments, Institutions, Universities, Schools, Companies and private persons have to be considered in the frame of a basic IT security concept. Before focusing on IT, there needs to be a common agreement on the notions of security in general and related terminology.

Dr. Peroz defined *security* as the state free of risks or free of endangerment. In this definition security refers both to single individuals and to other collective beings, to real objects and systems as well as to abstract subjects. He further noted that there is neither a technical nor organisational possibility of absolute security.

Security is always relative and is dependent of the judgement regarding the risk potential in each area.

A general framework for security must contain the following elements:

- juridical basis,
- human resources,
- task allocation,
- inventory,
- allocation of security level,
- infrastructure, and
- training for affiliates.

In continuation, Dr. Peroz gave a series of security threats and measures in different aspects of life, among those occupational safety, traffic, economy, politics, public buildings, and nature.

In traffic for example, several technical measures are taken in order to minimize the threat of an injury in a traffic accident: brakes, seat belts, air bags, etc. Furthermore organizational measures as traffic rules are implemented which are again accompanied by technical measures such as traffic lights. Only both an understanding of the organizational measures together with functioning technical measures will raise the security level.

Coming to IT security, Dr. Peroz defined three fundamental aspects to be considered:

- Confidentiality,
- Availability and
- Integrity.

He further identified the following four categories of risks to IT goods: force of nature, organizational deficiencies, technical deficiencies, and intentional acts. The force of nature combines threats such as lightning, fire, and water, whereas the organizational deficiencies may include a lack of regulations and guidelines, a lack of staff, or a lack of training.

Technical deficiencies are the threats created through the breakdown of power supply, the breakdown of internal supply networks, or the breakdown and loss of databases. The last category of threats is due to criminal nature: examples include manipulation or destruction of IT components or data, theft, vandalism, attacks, and computer viruses. However, with all of these risks it can be dealt with. Measures to secure the infrastructure include the following of rules and regulations, the construction of safe buildings, and ensuring a stable power supply to the hardware. To cope with the threats that evolve from the human resources, the key element is the training of all staff. Further the staff must be obligated to follow the rules. An IT advisor should be appointed to coordinate this process.

The management on the other hand should define an IT security policy for IT usage. The tasks within the policy must be allocated and duties separated among different persons within the staff. Guidelines should be elaborated to help the users. In order to deal with further help demand, counseling and advice should be available to all users.

Dr. Peroz concluded his presentation with the postulation of the need of Afghanistan for an office that coordinates all IT security measures on a national level. The establishment of this Office for Security in Information Technology (ASIT) will be an important step toward a secure and sustainable IT infrastructure in Afghanistan.

Sustainable Network Security for Higher Education in Afghanistan

Chi-Thanh Christopher Nguyen, TU Berlin



The talk about sustainable IT in Higher Education in Afghanistan by **Mr. Chi-Thanh Christopher Nguyen**, lecturer for Computer Networks and Security at the Department of Communication-Based Systems at TU Berlin, focused on the three main aspects of security, which are confidentiality, integrity and availability. Institutions of higher education handle sensitive data which needs to be protected. Examples include exams, personal data from students and staff, grades, diplomas and other data which must be retained and produced on request.

It was emphasized that security is not a state. It is a process. While it is not difficult to design a network and declare it 'secure', the underlying security assumptions have to be continuously verified whether they are still valid. Mr. Nguyen proceeded to An example was given of a network which was implemented in 2003 at an institution of higher education in Afghanistan: a satellite uplink is connected to a firewall/router, behind the firewall there is a server and clients. The network plan was good, there was a router/firewall which protects the internal network from external threats. All traffic from and to hosts on the network must pass the firewall.

However, not long after this network was established, demands came up to give other institutions Internet access too. A second router was installed behind the firewall, giving provisional protection.

When the router had no more free PCI slots (Peripheral Component Interconnect) for new network cards, new users were directly plugged into the switches.

This network concept was not sustainable. It worked as originally planned, but it had no provisions for growing the network beyond its original extent. When the network grew, the original security assumptions (all traffic from and to the internal network must pass the firewall) were invalidated. Now the internal network is exposed to attacks from the 'new' parts of the network, over which we have no control.

The next example that Mr. Nguyen discussed are wireless networks. Part of the 802.11 specification was the encryption method Wired Equivalent Privacy (WEP), introduced in 1997. It was regarded as secure until 2001, when an attack was published which could defeat WEP within minutes. So all models which made assumptions about the security of WEP had to be re-evaluated in the light of the new results.

He further proceeded to discuss electronic "high security" locks. Regarded as highly secure, many organisations worldwide rely on these and similar kinds of locks for perimeter security. Until two days before the conference a successful attack was demonstrated. Besides, the locks contain auditing functionality, which has also been defeated. So not only could an intruder gain access to a facility, he could also place the blame on the person to last legitimately open the lock. All security models which make assumptions about the security of these locks need to be re-evaluated now.

Mr. Nguyen concluded that sustainable network security requires that a process is in place which continually improves on security and reacts appropriately to new developments.

New developments are not necessarily newly-discovered security vulnerabilities or threats, they can also be part of the development of the entire Internet. He pointed to the ubiquitous Internet Protocol in Version 4 (IPv4) which is used by almost all Internet users at this time. However, IPv4 addresses are almost exhausted. Within a few years, it will not be possible to get any more new IPv4 addresses.

What is going to happen then? At first, people are going to use more Network Address Translation (NAT). NAT is being used to have multiple computers share one public IP address, eg. a network behind dial-up Internet access. A proposal for so-called "carrier grade NAT" would extend this to entire groups of customers of an ISP. But NAT has severe disadvantages, such as not allowing two-way connectivity. While workarounds such as UPnP exist, these are insecure. And NAT suffers from scalability issues in Web 2.0. For all these reasons, NAT cannot be called sustainable.

Governments and organizations worldwide are now pushing for IPv6 as replacement for the aging IPv4 standard, with very limited success so far. Part of the reasons behind this is that many security assumptions one might make about an IPv4 network behind NAT no longer hold when applied to an IPv6 network. So any sustainable security model should either not rely on assumptions about IPv4 or include provisions for IPv6.

After discussing what should be part of a security model, Mr. Nguyen pointed out that it is also important to consider what should not be part of the security model. Making a complete list of provisions which a security model should make is not feasible, this would take too much time and effort and result in a very complex model. Instead, security must be continuously improved. Another problem is that security models can be too complex, which means that the model protects against marginal threats or the staff is not sufficiently familiar with the measures.

If the security model is too complex, the consequences can be that the staff is not able or willing to properly follow the necessary procedures. So each step of creating such a model must involve the management and staff through training and incorporating feedback.

The suggested steps from the German Federal Office for Information Security (BSI) are the following:

- Initiation of the security process
- Accepting of responsibility by the management
- Designing and planning the security process
- Creation of the policy for information security• Establishment of a suitable organisational structure for information security management
- Provision of financial resources, personnel, and the necessary time
- Integration of all employees in the security process
- Initiation of the security process
- Creation of a security concept
- Implementation of the security concept
- Maintenance of information security during live operations and implementation of a continuous improvement process

Mr. Nguyen concluded his presentation, emphasizing again that sustainable security requires implementation of a proper security process, which must make sure that all important threats are defended against, but on the other side it is not too complex for the staff to

handle. And procedures must be in place, which check the security assumptions and appropriately reacts to new developments.

Day 2: August 5, 2009

IT Security Workshops

In the workshop part of the conference, the participants were divided into two working groups. Each working group was introduced with an introductory talk by **Mr. Herlitz** and **Mr. Nguyen**. Both working groups followed the same structure, but focused on different aspects of IT security. In the first part of the workshop it was discussed, which IT goods need to be protected in the Afghan higher education system and which threats these goods are exposed to. In the second part working group 1 was discussing which of these threats could be encountered by policy measures whereas group 2 was discussing possible technical measures. In the third part of the workshops the results of the second part were discussed.

Introduction to Security Aspects I: Applications and Usage Regulations



Mr. René Herlitz gave an introductory presentation to the first working group topic. He presented three examples of threats that may be found at universities.

As the first example of a security threat, the following scenario was presented: A university student, Student A, has completed a basic computer training course. He is now granted access to the IT center of the university and has been given a username and password. Student B is a good friend of Student A. He has not yet done a training course, but would like to write an e-mail. In order to do him a favor, Student A provides Student B with his password. As Student B had not been trained at the IT center he did not know that

he has to log out of the system after use. At this computer an attacker now has access to the personal data of Student A and to the internal network of the university. This scenario was a combination of two threats: social engineering, a term which describes the process of obtaining credential information from a person through information that is available through social contact with that person, and a lack of physical access control to the IT center.

In the second example a common medium for the spread of viruses was presented, the USB flash disc. Although by itself the flash disc is not a threat, it is a medium that may contain viruses or worms. Since the operating system Windows by default runs auto-start programs from newly inserted flash discs, malicious programs can spread even without a network connection. In combination with the fact that most users are running Windows with an

administrator account, this behavior makes the operating system highly vulnerable. To forbid the use of flash discs is certainly not a solution since it is needed for everyday office and academic work.

The third example was a small live demonstration of a so called cross-site scripting (XSS) attack to steal a password from a user. The following scenario was chosen: a fictitious university named Foo University has a website with several functionalities, among them a forum, on which users can give comments, and a grading system, to which only lecturers have access and in which they can store the grades of the students. In the scenario it was shown that a badly written web application (the forum) can be a threat to a different application on the same domain (the grading system). In the demonstration a student left a comment in the forum that not only contained text, but also a link to the login page of the grading system and some JavaScript code that is executed upon clicking on the link. As the forum was badly programmed it did not make any security checks on the user input, but completely trusted the user and just outputted the complete post in the forum. Now anyone that clicked on the link in the forum was directed to the normal login page. The only difference was that upon clicking on the link, JavaScript code was executed that automatically read the password that was provided on the login page. In the demonstration the password was just reproduced in an alert box, but it could have been sent anywhere on the Internet by slightly modifying the code. By using this XSS attack students would have been easily able to steal the usernames and passwords of their lecturers for the grading system.

At the end of his introduction Mr. Herlitz rose the question on how security policies can help to minimize the mentioned threats and what kind of additional measures are needed for the policy to be effective. These questions were discussed in working group 1.

Introduction to Security Aspects II: Technical Issues

Mr. Chi-Thanh Christopher Nguyen introduced technical aspects of IT security. Institutions of higher education have large amounts of data stored in a de-centralized way, with very different security requirements. Mr. Nguyen addressed first the common need for availability.

The standard way to increase availability is redundancy. In a given network, having a single network connection to a single server means that if either fails, then the clients will no longer be able to access the data. So the first step can be to have two or more redundant network connections, preferably along different routes. However, not only the network needs redundancy, but the data itself and the servers on which it is stored too. Redundant data storage can be achieved through backup. With servers, especially database servers, redundancy is further achieved through replication and clustering.

The next part which was addressed in the presentation maintaining data integrity by using access control to limit who has the privileges to modify the data, and cryptographic hashed and digital signatures. Similarly, confidentiality is maintained by access control, too, and by using proper encryption schemes for transferring the data.

The demonstration that Mr. Nguyen gave during his presentation pointed out the insecurity of unencrypted wireless networks. The audience was invited to connect to a specially prepared wireless network, and Mr. Nguyen could then monitor their activities using special software tools.

Working Group I: Applications and Usage Regulations



The working group on Security Policies was moderated by **Mr. René Herlitz**, TU Berlin, and **Mr. Naweed Rahmani**, lecturer at Balkh University. By bringing together persons that are working on the administrative and management side of the universities and IT experts, such as Computer Science lecturers and IT advisors, the workshop has been very productive (see Results section below). In this atmosphere it was possible to discuss security policies from the administrative as well as the technical side. Awareness of the security problems were raised among the participants.

Working Group II: Technical Issues



The second working group on technical security measures was moderated by **Mr. Chi-Thanh Christopher Nguyen**, TU Berlin, and **Mr. Abdul Rahman Vakili**, lecturer and IT administrator at Herat University. During the workshop, the participants analyzed the IT security needs of an institution of higher education in Afghanistan focusing on the technical side. During the workshop a mixture of both lively and productive discussions and detailed technical explanations were experienced. The positive results of the three workshop sessions were presented on the third day.

Day 3: August 6, 2009

The aim of the final session of this year's conference on IT in higher education was the presentation of the outcomes and the discussion of the results from the working groups that would lead to a conclusion of the next steps to take. The session was moderated by **Prof. M. Osman Babury** and **Dr. Nazir Peroz**.

Presentation of the Results of Working Group I: Applications and Usage Regulations

Mrs. Seema Azimi, Computer Science lecturer at Kabul Polytechnic University, presented the results of the first working group. The first part of the working group was to gather all kinds of IT goods that are valuable in a university. The working group participants gathered:

- Official University Data
- Personal Data
- Software, e.g. University Website
- Hardware Equipment
- Internet Bandwidth
- CPU Time of University Servers
- Software
- Power Supply



These goods are each exposed to certain threats, which were grouped into three categories: equipment threats, network threats, and threats from insecure applications. In the first category all kind of natural threats were found: high and low temperatures, humidity, dust, water, and fire. Unauthorized physical access (e.g. through insecure doors or lost keys) was a threat to the hardware equipment as well as power failures, and intentional or unintentional improper use.

The software running on university hardware might also be a threat, if the standard software that is used is not updated to the latest security patches or if university applications were programmed in a way that left security holes open (e.g. the forum of Foo University in the introductory presentation). But usernames and passwords can not only be obtained by insecure applications, but also through so called Social Engineering, i.e. a person is finding out another one's password by asking or guessing names of relatives etc. Through all software security holes viruses or worms could be installed at the local computer. Sources are numerous: malware from fake websites, e-mail-attachments or HTML mails, flash discs, and others were named. A virus might even cause that the computer becomes part of a bot-net (a network of thousands of infected computers, that are remotely controlled by an attacker) and thereby attacks other computers without the knowledge of the user. One attack in which bot-nets are used is a distributed Denial-of-Service-Attack (DDOS), where thousands of computers are accessing the same service at the same time and thereby causing the service to become unavailable.

Mrs. Azimi continued to mention the three categories into which the working group 1 organized the possible measures to take against these threats:

1. Infrastructure
2. Training
3. Organization / Management

Possible measures to protect the infrastructure from natural threats are: dust filter systems or smoke sensors. During the working group discussion it got clear that the threats are the same at all universities, but the measures to be taken might have to be adapted to the local surroundings. One university might require the users to take off their shoes in the IT center in order to encounter the dust problem, others might suffice a long corridor before entering the IT center. To encounter other threats to the equipment, cleaning guidelines, physical access restrictions for unauthorized users, and UPS (uninterrupted power supply) systems were mentioned.

One of the workshop findings was that many security measures were not sufficient if the users were not trained on security issues. It was recommended that all university members who use IT should be trained on security, in order to be aware of the threats and to know the correct behavior to circumvent these threats. Basic training should include the training on Internet guidelines, the use of office applications, the choice of strong passwords, and others. One workshop participant suggested that the MoHE should provide basic IT training packages which could be taught at all universities.

Further there should be specific advanced training for users who are responsible for IT tasks that go beyond the basic usage. These persons include IT administrators, technical staff, application developers, and web designers. Topics depend on the specific working area, they might include: choice of antivirus programs, software update plans, use of firewalls, or good programming practices.

As an organizational measure it should be clearly specified who is taking the responsibility for which tasks within the security management. If the university is running a website on its own server, it should be clear, who is taking care of the hardware equipment, who is responsible for security updates of the operating system, the web server, and further software running on the server, who is responsible for the security of the web applications and web pages of the university, and finally who is responsible for the content of the website.

The results of working group I can be summarized as follows:

- There is a need for an IT security policy at each university. A Security Policy Framework and Security Guidelines should be provided by the MoHE, since threats are the same at different universities, but different measures might be taken to encounter them.
- The Security Policy must incorporate plans for a secure infrastructure, security training, and security management.
- Organizational security measures are always accompanied by technical security measures and vice versa.
- The Security Policy must not be static, it is a constant process in which the following steps are continuously iterated:
 1. Preparation of Policy
 2. Awareness, Penetration, and Training
 3. Evaluation of Outcomes
 4. Improvement of Security Measures

- The whole process will only work sustainably if there is a person within the university who is responsible to coordinate all security measures. There is a need for an IT security officer at each university.

Presentation of the Results of Working Group II: Technical Issues

The findings of the second working group were presented by **Mr. M. Mussadiq Jalalzai**, Computer Science lecturer at Kabul University.

The workshop began with the identification of which kinds of data are stored at such an Afghan higher education institution and which aspects of security need to be protected.

Among the identified kinds of data with security needs are:

- Data stored on a public web server (needs availability; A)
- Evaluation and Grades (needs all three of availability, integrity and confidentiality)
- Users' passwords (needs integrity and confidentiality; I and C)
- Profiles and personal data (all)
- Information about lecturers and staff, e.g. bank account, CV (all)
- Administrative information:
 - public information: (I, A)
 - non-public information: (all)
- Official documents, certificates, diplomas: (I, A)
- Library data and information system
 - Information about users: (all)
 - Information about books and other publications: (I, A)
- Research data
 - Before publication: (all)
 - After publication: (I, A)



It was then proceeded to discuss some of these issues, beginning with an example library information system, consisting of a database server, a client and a network connection between them. The server stores the data, and the client can read and modify the data on the server.

The confidentiality of the data which is transferred over the network link can be ensured by using encrypting protocols, such as SSL/TLS for the application data or WPA for encrypting all network traffic. These protocols also guarantee integrity.

For availability, we need to guard both against failure in the network and failure in the server. This means to have two or more redundant network connections, preferably along different routes, so that if one of them fails, the client will still be able to communicate with the server. With the database, redundancy is achieved by setting up a cluster of servers so that failure of one of the servers can be sustained by the others without interruption of service.

The next topic to be discussed was access control. One problem of access control is making sure that only authorized users can access the data. So users need to be authenticated. Or more precisely, first identified and then authenticated.

Common identification/authentication pairs are:

| Identification | Authentication |
|----------------|----------------|
| User name | Password |
| Smart card | PIN code |
| Biometry | Biometry |
| RfID | RfID |
| Passport | Picture |
| Name | Signature |

We could for example consider biometry (e.g. a fingerprint sensor) for authentication. One problem with this is that it is also used for identification, and especially fingerprint sensors often suffer from serious issues, such as

- Vulnerability to replay attacks (if transmission between sensor and authentication server is not encrypted)
- Replica fingers can be made so that the sensor is unable distinguish it from a real finger
- False positive/false negative rates are high with inexpensive sensors

But it has an advantage, namely that it is very easy and convenient to use. The user does not need to memorize a password or carry another type of authentication token with him. The consequence of the drawbacks is that usually, the “classic” method of authentication with username and password is used.

The other examples that were discussed during the workshop are summarized in the table below:

| Problem Security | Aspects | Solution |
|---|---------|--|
| Unauthorized listening to WLAN traffic | C | Encryption |
| Research data release | C, A | Key Escrow |
| Library database accessibility | A | Redundant network and server cluster |
| Unauthorized modification of data | I | Checksums, authentication |
| Releasing part of administrative info | C, A | Separation of servers and pushing of public data |
| Safe disposal of storage media (hard disk, flash memory, CDs, etc.) | C | Policy (mandating encryption, or shredding/burning afterwards) |

Discussion



The discussion was moderated by Prof. Babury and Dr. Peroz.

Before implementing IT in Afghanistan, it was difficult to handle all the works, but today in aspect of education especially in MoHE, most of the works are computerized. Infrastructure and networks are needed for the universities as well. Some of them have already taken this step, but the next step is to consider training staff and security. The head of universities should use the ideas which are collected here

in the conference and support the teachers who are going to teach and implement IT in universities. In aspects of security we have to think about the the students data stored in the servers as well.

Dr. Hamidzay, President of Kabul Education University, noted that we should prevent the problems before we face with damages. In the aspect of IT training and educating people, it is necessary to start on time. We have to use IT properly as well. Infrastructure and hardware is not sufficient if the expertise and knowledge about the systems are not there, it will be impossible to improve the university's activities with the help of IT.

Dr. Shirshah, Dean of Foreign Affairs Office in the MoHE, said that it is important to equally extend IT in all universities. Otherwise there will be a lack of good connection and coordination among them. This may go as far as losing scholarships for the lack of good connectivity. Something needs to be done in aspect of having a proper connection and cooperation between MoHE and universities.

Mr. Shafiq, director of IT in Kabul Medical University, said that at his institutions there are many computers but not enough lecturers to teach. In his opinion, the most important problem is that we do not have IT personals in our university and no salary is considered for them.

Prof. Rashid, Dean of Alberony University, mentioned that, most of the time we are speaking about IT in public universities, but the private universities should be a part of this process as well.

Conclusion

Prof. M. Osman Babury started the summary and conclusion by thanking for the valuable outcomes from the workshop. This conference has been the first conference within the Ministry of Higher Education that has been dealing with the topic of IT security. He is glad that the importance of this topic was spread throughout all Afghan higher education institutions through the conference.

Prof. Babury further stated that he would be glad about any comments on the draft of the IT Security Framework prepared and distributed to the participants by the IT department of the MoHE. After its finalization the framework will be sent out to all universities where it can be adopted as a security policy according to the specific needs of the university.

Prof. Babury further stated that the implementation of policies needs resources and facilities, which have to be identified. On behalf of the human resources side, he emphasized the increase of qualified personnel at six Afghan universities after the return of 25 lecturers currently participating in a Master program at TU Berlin in March 2010. To further extend the qualification of university staff, Prof. Babury announced that talks about future scholarships have been and are being held with different foreign institutions, TU Berlin being one of them. On the infrastructural side, the universities of Kabul and Herat can count on well-equipped IT centers with qualified staff that will play a key role in raising security awareness and training students, lecturers, and employees on this issue. The third resource needed is financing. The MoHE will implement its promises and has set up a renewed financial plan for five years. Currently the MoHE is trying to coordinate and synchronize the efforts within the universities, as not all universities are showing the same progress in achieving the planned goals. He concluded his speech by thanking Dr. Peroz and his Ziik team from TU Berlin, the DAAD, and German Embassy for their support.

Dr. Nazir Peroz remarked that the responsibility for IT risks is not limited to the respective IT departments and its personnel, but it is a task of the whole society, of common sense and human reasoning, of thoughtful organizational arrangements, and of responsible and well trained and well informed staff. Therefore the Afghan society needs, first trained personnel, second trained personnel, and third trained personnel. This personnel will later

independently adhere to security requirements in a disciplined at routine manner and will train the staff of the risks of the technologies at their workplaces.

Security is a basic need of human beings and therefore of society. The societal changes, the increasing number of IT systems, the increasing dependence on technology, the lack of personal and technical resources as well as the small financial budgets force Afghanistan to think about IT security. Otherwise Afghanistan will face massive damage through IT risks which will limit the country's ability to develop, act, and manage.

Dr. Peroz continued to give a short reflection to follow up his presentation on the first conference day. IT security is an ongoing and never ending process in which 100 % can never be reached. 100 % availability and 100 % integrity cannot always be achieved at the same time. IT threats are worldwide and Afghanistan is no exception in this regard. But plans need to be made how attacks can be encountered in the future because currently Afghanistan's IT is like a glass house, and all neighbors can look inside. He further remarked, that in the conference we have covered issues such as terms, law, training, management, and infrastructure. Although some laws regarding IT are already in place there is still deficiencies in enforcing these laws. IT users need to be made aware and trained in order to use IT according to these laws, policies, and rules. This challenge will need to be encountered by the growing young generation of IT professionals in Afghanistan.

Regarding the drafting of IT policies and laws, Dr. Peroz further suggested, that these activities should be done in cooperation and coordination with the Ministry of Communication and Information Technology, as this issue is effecting both sectors.

Dr. Peroz thanked Prof. Babury and Mr. Saay for their continuing efforts in the establishment of a stable IT supply at Afghan universities.

October 9 – 11, 2010

IT Conference Part VI in Kabul

Conference topic: Application Project by the Computer Science Master's Graduates from the TU Berlin

Day 1: October 9, 2010

Welcome and Opening



The conference was opened by Mr. **Sarwar Danish**, Acting Minister of Higher Education, who welcomed all participants. The minister stressed the important role that electronic systems play in today's management and administration. Through higher education the knowledge in this area can be strengthened. Currently there are computer science faculties at the universities of Kabul, Herat, and Nangarhar. The goal is to have computer science faculties in all Afghan universities. The graduates who have just

returned from TU Berlin can help us in building up these faculties. On this occasion the minister thanked the TU Berlin for their continuous support, especially Dr. Nazir Peroz. He concluded his talk by stressing the importance of not only the higher education in computer science, but also of IT trainings for administrative staff, as they will be the users of the systems that are developed at the universities.



The second welcoming speech was held by **Mr. Rüdiger König**, German Ambassador. The ambassador welcomed all participants in German language. He said to be proud of speaking German, as the computer was invented by Konrad Zuse, also a German. From the experiences of Konrad Zuse we want to learn one thing: We want to make a connection between science and practical application. This can be achieved in Afghanistan through the collaboration of the MoHE and the team of the

TU Berlin around Dr. Peroz. The ambassador agreed with Minister Danish about the importance of IT in today's world. But the phrase "computers are dumb" is still true. The intelligence is brought in by human beings who form the brain, heart, and hands of these machines. Higher education, science, universities and IT are nothing more than human beings, that are capable to contribute to the project of rebuilding a country after 30 years of war. Germany has been helping in this project since 2001 and everyone in this conference, but especially the 25 graduates, are part of this project. What the MoHE, the DAAD, and the TU Berlin were able to achieve through the continuous strength and effort of Dr. Peroz is an enormous success. To celebrate successes is nice, but it must also be a motivation to continue

this in the future. 25 is an impressive number, but everyone here wishes that we will soon have 250 or 2500 Master graduates, because the demand is high, in teaching, application as well as the economy. Why should the development in IT that we have seen in India not be possible in Afghanistan? Mr. König confirmed that he is convinced that this is possible and wishes that for all participants. He is happy that Germany can contribute towards this.



Words of welcome were addressed by **Mr. Lars Gerold**, head of the Afghanistan-Pakistan section of DAAD. Mr. Gerold gave an overview of the structure and the past events of the Afghanistan projects that were financed by DAAD from the fact finding mission after the Petersberg conference in March 2002 until the conference of today. With the new Secretary General, Dr. Dorothea Rüländ, the support for the higher education sector in Afghanistan remains high on the agenda in the DAAD. With the team of the TU Berlin the Ministry

found an excellent partner to develop a suitable and sustainable structure to implement the plan. The DAAD is proud to be able to facilitate this cooperation.

In March 2010 the freshly graduated Masters in Computer Science were celebrated in the presence of Cornelia Pieper, Minister of State for Cultural Affairs of the German Ministry of Foreign Affairs, at the Technical University in Berlin. All graduates are here today and serve at their home universities. Mr. Gerold said he is looking forward to learn more about the work of these graduates at their home universities during the course of the conference. Mr. Gerold thanked Minister Danish and Deputy Minister Professor Babury for the excellent co-operation with the DAAD and the German universities for already so many years.

He continued to thank Ambassador Rüdiger König as the representative of the German Ministry of Foreign Affairs, which secured most of the funding that DAAD can provide for activities in Afghanistan. Already before he came to Kabul this summer Ambassador König was a great source of support for DAAD's work while heading the Afghanistan department of the German Ministry of Foreign Affairs. Further thanks were dedicated to the excellent lobby work of Dr. Peroz in the German capital.

Through the support of the German Foreign Office the DAAD was able to send green lights for several urgent projects here in Afghanistan. Among those is the second round of a Computer Science Master program at the TU Berlin. Mr. Gerold concluded his words by thanking the team of the Technical University Berlin for their efforts in supporting the establishment of academic IT structures and IT knowledge in Afghanistan. He especially thanked Dr. Peroz personally for doing an outstanding job in Afghanistan and acts also as an excellent advocate for Afghanistan in Germany.

Graduation Ceremony

Following the words, the ceremony of the official handover of the first generation of computer science master's certificates from the TU Berlin started.

The graduates received their computer science master's certificates and transcripts from Minister Danish, Ambassador König, Prof. Babury, Mr. Gerold, Dr. Peroz, Prof. Amin, president of Kabul University, Prof. Habibullah, president of Balkh University, Prof. Husseini, president of Herat University, Dr. Ezatullah Amed, president of Kabul Polytechnic University, as well as two of the lecturers from TU Berlin, Mr. Herlitz and Mr. Magnus. Additionally to the handover of the certificates, the two students with the highest overall grades were rewarded with laptops, that their lecturers had been using during the program. Minister Danish handed over one laptop to the best student, Mrs. Seema Azimi, and Ambassador König handed over the second laptop to Mr. Abdul Saeed Ahmadi.



Keynote Speeches:

National Strategy for Higher Education in Afghanistan

Prof. Osman Babury, Deputy Minister to the MoHE.



The first talk of the afternoon session was given by **Prof. Osman Babury**. After warm words of thanks to the TU Berlin and DAAD, Prof. Babury presented the National Strategy of the MoHE. The strategy consists of two parts: the development of sophisticated lecturers and the curriculum development. As human resources are one of the most important points in higher education, the first part of the program is addressing the further education of lecturers. The Master graduates in computer science are just one example of actions undertaken within this part of the program. Another group of 25 lecturers will participate in the second round of the program of TU Berlin and will be leaving for Germany in the next weeks. As a

representative of the MoHE, Prof. Babury thanked the German Embassy, the DAAD, the TU Berlin, and Dr. Peroz for making this possible.

The second part of the strategy is the curriculum development. With the support of TU Berlin, the MoHE has designed a curriculum for computer science, which is currently implemented at the universities of Herat and Kabul. This curriculum will be further developed and sustained in these faculties and will also be implemented in the other computer science faculties throughout the country.

Philosophy and Objective of the IT Projects of the Master Graduates

Dr. Nazir Peroz, head of the ZiiK at TU Berlin



Dr. Nazir Peroz gave an overview of the philosophy and sustainability of projects from TU Berlin. He began his speech by stressing the importance of education: "Education investments are investments in the future". In the area of IT the Afghan education started off from a difficult point in 2002. When Dr. Peroz first visited Afghanistan in that year, no one had heard about IT and there was only a few mobile phones. But since then the situation has evolved rapidly.

Today almost everyone has a mobile phone, some even have two or three. This shows that all technology will eventually come to Afghanistan. The problem is, that the knowledge usually lags behind and comes afterwards. It is a potential risk if the technology is there, but the education on it has yet to come.

Deputy Minister Babury had talked about a nationwide curriculum for Computer Science. Every university first has to check whether they meet the requirements and resources to implement such a curriculum at their Computer Science faculty. One of these requirements is a modern administration.

Dr. Peroz continued to talk about the role of the ZiiK, which is collaborating with the MoHE in the areas of IT strategy development, establishing a basic IT infrastructure, and demand-driven education.

Within the IT strategy development pillar, action plans are developed. The goal of these action plans is a sustainable and applicable IT environment in Afghanistan. Before applying one of these plans, there needs to be a concept for the plan. These concepts must be embedded in the national IT strategy of Afghanistan, which was started in 2003 when eight university presidents as well as the ministers of communication and higher education came to TU Berlin to discuss the IT strategy of Afghanistan. It continued through the establishment of the IT section at the MoHE, which is coordinating all IT activities in the sector of higher education in Afghanistan.

For the implementation of the mentioned concepts, a basic IT infrastructure is needed.

With the cooperation of TU Berlin, IT centers have been established in Kabul (ITCK) and Herat (ITCH) universities. Furthermore PC pools and workshops have been constructed at several department and universities. Since students are culturally used to study from physical books and not e-books, two computer science libraries have been established at Kabul and Herat universities.

The third pillar in the philosophy of TU Berlin is demand-driven IT education: this has been provided by numerous summer and winter academies for IT administrators, held at TU Berlin. These administrators act as multipliers at their universities and train further generations of administrators at their respective IT centers. Furthermore students and staff members have been trained in these academies. During the first generation of computer science courses at Afghan universities, TU Berlin was helping to compensate the lack of lecturers by sending computer science lecturers to Herat University to teach in the Bachelor course. From six different Afghan universities, 25 lecturers were then given a scholarship to do a Master's degree in computer science at TU Berlin. These scholarship holders have now graduated and are presenting their application projects within this conference.

The objective of these application projects is the implementation of the acquired knowledge at TU Berlin to independently solve challenging tasks in economy, administration, and science by developing IT solutions for the specific needs and requirements of their respective universities in order to establish IT structures at their respective universities.

Dr. Peroz concluded that in addition to the current Bachelor education in Computer Science in Afghanistan, the country also needs more lecturers that reach Master and Ph.D. level in cooperation with international universities.

Dr. Peroz thanked Minister Danish, Deputy Minister Babury, the MoHE, in particular the IT department, the German embassy, the German Foreign Office, the DAAD, and the World Bank who all made these projects successful through their long-term collaboration and financial support.

Creating an IT Research Center

To elevate the scientific environment to an international level, research is needed as much as teaching. **Mr. Abdul Saeed Ahmadi**, Master graduate from TU Berlin and lecturer at Kabul University, presented his ideas on a Center for IT Research and Development.

The motivation of this idea lies in the lack of research that is currently done in the area of computer science in Afghanistan. This research should fill the gap between academic studies and the industry. The objectives of the center are:

- Introduction of ICT research culture in Afghanistan,
- Establishing an ICT research community, and
- Involving the ICT industry in higher education.



In order to implement this idea, Mr. Ahmadi suggests to train fourth year computer science students in basics of scientific research and the access and usage of online scientific research journals. The students should then work on a research project themselves. In the first year of the center's functioning these projects could include the analysis of the IT needs of Kabul University. In the long term the center seeks to place the students as interns in the Afghan ICT industry for a final year project. Research should be extended towards national and international projects answering the questions of Afghanistan's role in the international ICT field, a suitable legislative framework in the area of ICT, and the role of ICT in Afghanistan's education system. For a successful implementation of this idea the support of the MoHE and Kabul University is needed in order to satisfy the demand of human and technical resources of the center.

These resources also include the access to online research journals from Kabul University's network. The idea is to implement this center at the Computer Science Faculty of Kabul University. If the evaluation of the outcomes of the center proves successful, the same idea can be implemented at other computer science faculties in the country.

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Application Project of Computer Science Master graduates

The second day of the conference was reserved for demonstrations of applications that are to be implemented in the next months in the Afghan higher education system. The day was moderated by **Mr. René Herlitz** and **Mr. Ralph B. Magnus**, lecturers from the ZiiK at TU Berlin. The applications were grouped thematically around four areas: IT policies, IT infrastructure, IT administration, and IT education.

National ICT Policy for Higher Education in Afghanistan



The first project presentation was held by **Mr. Obaidullah Rashed** from Kabul University on the topic of a “National ICT Policy for Higher Education in Afghanistan”. Such a strategy is considered necessary to reach the goals of establishing, expanding and maintaining a capable IT infrastructure, providing coordination and cooperation between the IT related projects in MoHE and universities, and providing quality control and accountability for results that best serve the higher education community.

Further the linkage of universities with foreign universities and research communities needs to be established, which can only be done by ensuring a trusted and reliable technical environment. The strategy should instruct the universities and higher education institutions into an organized, standardized and policy based improvement, which results in a standard outcome of research and study and finally leads to sustainable education development in higher education. By giving the priority for IT in higher education, an increase in productivity, efficiency and effectiveness of the management system can be achieved. In the research stage for the IT strategy, Mr. Rashed conducted interviews with important stakeholders in the MoHE, the Ministry of Education (MoE), the Ministry of Communication and Information Technology (MCIT), and the universities.

Based on the interview findings an IT strategy was developed that consists of regulation for IT law, giving priority for IT infrastructure, adoption of IT education within the MoHE, universities and higher education institutions, finding the way of modernizing IT management, improving the cooperation and coordination while highlighting security aspects along all topics. Furthermore an action plan for the years of 2010 to 2020 based on prioritized aspect was written according to the current situation of IT in universities and higher education institutions in Afghanistan.

Developing a Nationwide IT Curriculum System for Afghanistan



Mr. Hamid Rahman Mohmand from Herat University had written his thesis on “Developing a Nationwide IT Curriculum System for Afghanistan”. A curriculum consists of everything that promotes learners' intellectual, personal, social and physical development as well as lessons and extracurricular activities which includes approaches to teaching, learning and assessment, the quality of relationships within university, and the values embodied in the way the university operates. It provides the framework for a syllabus and should focus on the people it affects. Changes in the education system towards IT should start in school: the MoE needs to implement principle changes in the education system by integrating

computer sciences in schools and providing schools with the right facilities. According to Mr. Mohmand bringing conceptual changes to the curricula of university studies must be of the highest priorities to the MoHE.

The only possibility to keep up with IT is to promote Afghan universities with computer science studies that would offer the country a chance to drive along with this fast moving sector.

Afghan universities should come to an agreement where they would offer one concrete and well planned curriculum for all faculties where they offer studies in the computer science discipline. This strategy has to be adopted for some period of time before each university could come to a level where they could offer topic-specific studies in computer science.

As far as the computer science discipline is changing constantly, this change should not affect the basis of the computer science curriculum in Afghan universities but should bring updates to the related parts of the curriculum. Core and basis of the curriculum for Bachelor studies in Computer Science has to be kept unchanged. That will help Afghan society better digest new changes in IT; because once the core is built concretely, then technological changes will not affect the society anymore.

A Strategy to Localize Open Source Software to Pashto in Example of Open Office



From Nangarhar University, **Mr. Haji-Gul Wahaj**, presented “A Strategy to Localize Open Source Software to Pashto in Example of Open Office”. Localization (L10n) is a process to adopt observance of a specific language locale. L10n is not restricted to the translation of software. It is closely concerned with culture, attitude and language conventions. There is a need for the localization of software in Afghanistan, because of a lack of professional software developers, not sufficient English language skills by the end user, and a low level of computer literacy. The goal of Mr. Wahaj's Master's thesis was the analysis of the status of open source software (OSS) localization status in

Afghanistan, finding suitable methods for translating software, a comparison and selection of the best translation tools, and developing a standard glossary.

These elements make up a standard and sustainable strategy. For this project Mr. Wahaj first analyzed and portrayed the current status of localization in Afghanistan. In his strategy he provides plans on how to motivate community members. It emphasizes on the advantages of OSS localization for Afghanistan, community formation and training. The developed strategy motivates volunteers to build software localization communities, which will help reduce the involvement of current private business driven organizations in the overall localization process. Furthermore, an example is provided of how Open Office could be localized to Pashto, which steps need to be taken and who can contribute to fulfill the task. A strategy is developed to localize OSS to Pashto and as a result it replaces the usage of pirated commercial software by localized Free and Open Source Software (FOSS) in Afghanistan.

A Concept for Establishing a Computer Science Faculty at Balkh University



Concept was presented by **Mr. Naweed Rahmani**. A computer science faculty is the core of IT services to a university, thus the establishment of a computer science faculty at Balkh University enhances the teaching and research additionally facilitates an efficient administration. The Master's thesis of Mr. Rahmani provides a functional concept for setting up the Computer Science Faculty at the Balkh University by coordinating involved parties and analyzing the current state. Furthermore the concept ensures a long-life functional computer science faculty with suitable recommendations in each and every aspect of establishing a computer science faculty at Balkh University.

An Online Encyclopedia for Scientific Terms in Dari-Persian and Pashto



Mrs. Seema Azimi from Kabul Polytechnic University presented her project on “An Online Encyclopedia for Scientific Terms in Dari-Persian and Pashto”. The idea of developing a web-based system for scientific terms of different fields came from a final year project in Kabul University in 2006. Although the then developed software itself was quite fast, functional and responsive to the technical requirements, the information that was used as the resource for that software, had been taken from an Iranian-Persian dictionary. Therefore it was not quite comprehensive and understandable for the native speakers of Pashto language and as well as for most of the Dari-

Persian speakers who had never been to Iran and therefore, were not familiar with the scientific terms developed and introduced by Iranians. In her project Mrs. Azimi aims to develop a similar system, but this time with a broader vision and concept. The main objectives and goals of this application is to: Enhance and improve the official languages of Afghanistan by introducing new terms into the languages and eliminating the foreign terms. This will provide a more efficient and widespread studying, teaching and researching. Furthermore a platform is provided where users will be able to search through their fields’ scientific terms and find the exact meaning and description of a term in their native languages. This facilitates and speeds up the long process of gathering the scientific terms through a forum interface. It will allow the Afghan professionals from anywhere to participate and contribute in writing articles for the encyclopedia. The two most important target areas that were considered during research were: Afghan schools and universities as well as the Academy of Science of Afghanistan (AoS), in which the Encyclopedia Department is currently working on a General Encyclopedia. The proposed solution is the Ariana Encyclopedia for Scientific Terms (AE) which will provide a search interface for 16 different scientific fields. It also has a forum interface which will overcome the manual process of collecting the terms and provide a better and more efficient way of populating the encyclopedia.

A Concept for an IT Center at Kandahar University



Mr. Abdul Sattar Kakar presented “A Concept for an IT Center at Kandahar University”. He also used this opportunity to provide to the audience an insight to the current IT situation at Kandahar University. The Master graduate encountered himself in a difficult environment after returning from Berlin: there is still no IT personnel within the university framework, a high computer and IT illiteracy rate among both students and lecturers, the PC labs are closed, and the university website is not updated and administered. The establishment of an IT center could lead to the following goals: supply of an Internet connection to all faculties, provide maximum time for students and lecturers to surf Internet for research and assignments by controlling bandwidth and traffic, as well as capacity building for lecturers and staff. In order to actually implement an IT Center, a lot of human resources are needed: IT personnel, an IT manager, network administrators, IT lecturers and web administrators. Furthermore maintenance equipment is needed in order to keep the IT center as well as the other PC labs running. The concept of IT center provided by Mr. Kakar can help to make proposals and convince the donor and funding organizations to fund for the IT center and can be extended to an IT strategy for Kandahar University.

Improving Maintainability of J2EE Applications by Applying the AOP paradigm



The final presentation of this session was held by **Mr. Abdul Saeed Ahmadi** who presented his project on “Improving Maintainability of J2EE Applications by Applying the AOP paradigm”. The main purpose of the project is to provide concept for improving the maintainability of a chosen J2EE application by applying the aspect oriented programming (AOP) paradigm. AOP is a new programming paradigm that complements the object orientated programming (OOP) paradigm. It increases modularity in object oriented applications by implementing crosscutting

concerns of a software in separate modules called aspects. In his Master's thesis Mr. Ahmadi applied concepts of AOP to the university cooperation platform UCOOP, a J2EE web application. The goal is to improve the maintainability of the system. Two different approaches were taken to find crosscutting concerns in the cooperation platform. Top down approach found logging crosscutting concern and bottom up approach found university ranking system and security check crosscutting concerns. Three crosscutting concerns were implemented with aspects. After implementation of these crosscutting concerns with aspects, the business logic of the application is monitored for readability, reusability, evolvability, modularity, code duplication and lines of code. It is clearly shown that application of AOP concepts is improving maintainability of the system. Crosscutting concerns now have modular implementation and business logic is more readable. Also it is shown how reusability can be increased and code duplication can be avoided. It provides a solution to make the application more evolvable and to reduce lines of code within the application's modules. Further more the thesis solution redesigned and implemented the cooperation platform. Mr. Ahmadi also provided suggestions for proper deployment and sustainable use of the platform at MoHE.

Sustainable Power Concept for Servers in IT Centers at Afghan Universities



The first presentation within this session was held by **Mr. Abdul Rahman Vakili** from Herat University. He presented his project on a “Sustainable Power Concept for Servers in IT Centers at Afghan Universities”. This project introduces a sustainable power concept for IT centers using one of the virtualization techniques called “domain migration” for IT centers in Afghanistan.

One of the most problematic obstacles against IT centers in every day work flow in Afghanistan is power instability and in particular power blackout. Considering the weak economical situation, offering a solution which can keep IT center servers and related services running at the time of power blackout is the goal to achieve in this project. When a power blackout happens, physical servers (hosts) will run on power backup of UPS batteries until switching to the power generator electricity. Each physical server runs some virtual servers (domains) which will be migrated to other physical servers at the time of power down in order to run maximum number of servers in fewer number of physical servers. In this case, before turning on the generator, we can power off one or more physical servers and as a result we would use smaller power generators that consume less amount of fuel. The proposed solution is applied in normal hardware used in IT centers and all software used for implementation is open source so that it does not require a licensing fee or purchasing software.

Sustainable Network and Bandwidth Management for Afghan Universities



Mr. Sayed Jahed Hussini from Balkh University presented a “Sustainable Network and Bandwidth Management for Afghan Universities”. Since its invention, the Internet has been offering different services. As the number of services is growing, so does their bandwidth consumption volume, which have resulted in a degrading service quality wherever the required bandwidth is not supported by the local Internet connection. Network operators have been trying different methods to utilize the network bandwidth at its maximum. Increasing infrastructure capacity might be a good idea, but it has some problems. First is the cost of increasing the capacity, which will increase the

bandwidth price and the second problem is that bandwidth heavy services e.g. file sharing applications, are becoming increasingly popular and can max-out all the bandwidth, as it becomes available. Bandwidth, as a network resource is a valuable asset, which has to be paid for. In countries like Afghanistan which lacks the infrastructure for such networks, its price is much higher than in other countries of the world. Mr. Hussini's Master's thesis looked at ways to increase bandwidth consumption efficiency in academic networks. He presented a concept in which mission critical traffic can always get a fair share of the bandwidth by minimizing non-mission critical traffic. By centralizing all Internet connections of the

university, the following goals could be reached: essential services for academic work are running at sufficient speed and each faculty is provided with a fair share of bandwidth. This is achieved by differentiating between important and unimportant traffic through a traffic shaper / proxy.

Sustainable Backup Solutions for Higher Education in Afghanistan



How the valuable resource of hard disk space can be used more efficiently was shown by **Mrs. Maria Sawaby** from Herat University in the presentation “Sustainable Backup Solutions for Higher Education in Afghanistan”. Mrs. Sawaby stressed that it is important for higher education to give the facility to users for their data (projects, researches) to be saved during their studies or works in the universities. The purpose of her Master's thesis study was to provide a cost neutral backup solution for higher education by using the existing resources in Afghan universities.

The iSCSI (Internet Small Computer System Interface) and NBD (Network Block Device) were tested, compared and evaluated according to their performances and reliabilities. Both simulate the remote devices like the local block devices and are used to transmit data over local area networks. RAID (Redundant Array of Independent Disks) levels were studied for the purpose of increasing fault tolerance for the devices. The RAID level 1 and level 5 have been implemented on both iSCSI and NBD accordingly. The backup application called sbackup (Simple Backup) which is also an open source software is chosen to backup on the remote devices. Mrs. Sawaby chose an open source solution which is easy to implement and suitable for the purpose. The main idea is that in each hard disk in a PC pool 20 GB is sufficient for the operating system and the user's home directory. The remaining 60 GB on an average 80 GB hard disk is empty. This makes a total of $25 \times 60 \text{ GB} = 1500 \text{ GB}$ in an average PC pool with 25 computers. This space can be used for backup purposes. With the backup technologies described above and with additional encryption to protect the data a sustainable solution was found.

Concept for a Sustainable E-Mail System at Afghan Universities



Mr. Ahmad Zia Sharifi from Nangarhar University presented a “Concept for a Sustainable E-Mail System at Afghan Universities”. Currently e-mail systems used in Afghanistan are by majority free webmail providers, but they offer limited facilities and cannot offer functionalities as dedicated systems for the universities. Considering the limited infrastructure such as unstable power supply and unstable Internet connection, the proposal is to build a sustainable email system for Afghan Universities and other higher education institutions with an individual name space for each university (i.e. nu.edu.af for Nangarhar University). This system will provide email facilities to all university administration

staff and faculty students, whether they are accessing from inside the university premises by using the Intranet or outside, from the Internet. In the project of Mr. Sharifi emphasis is put upon administrators training and knowledge transfer. Security for the equipments as well as the system is discussed in detail. The current economic situation of Afghanistan has been considered for choosing the various elements of the proposed system. Free and open source software is proposed for establishing email systems for the universities in Afghanistan. This type of software will not only prove to be economically advantageous in the long run but will also provide new grounds for teaching and experimentation. The availability of free source code along with the servers opens up new doors for the modern research and development in Afghanistan with no additional costs.

Concept for a University Finance Management System



The first presentation within in this session was held by **Mr. Mohammad Ismail Khattab** from Nangarhar University. He presented his “Concept for a University Finance Management System”. The main purpose of this project is to design a systematic, well structured and consistent concept of a system for the University Finance Department. The new concept covers all aspects necessary for this department for a better understandability to computer software and to computer environment. All procedures in this department are currently carried out manually.

With the usage of the proposed application the department would become more stable and it would be easier to control its works. The implemented application keeps track of the records and activities and stores them in a database. It will automatically calculate the monthly salaries of all employees and generate annual expenditure reports of the university.

The application has been localized into three languages: Pashto, Dari, and English. It is platform independent, secure, reliable, and developed entirely in open source software.

Concept for a Patient Emergency and Management System (PEMS)



Mr. Mohammad Shafi Tokhi from Herat University presented an application that is used outside the higher education system, a “Concept for a Patient Emergency and Management System (PEMS)”. Mr. Tokhi gave a short overview of his Master's thesis, which discusses how to develop a J2EE web application from a very primary step towards requirement elicitation, information gathering, evaluation, and implementation. As an example the thesis applied the above mentioned concepts for developing a Patient Management System for Herat Regional Hospital that is able to computerize the main activities of the

hospital. The application is evaluated and tested by the users and its already under customer usage. Mr. Tokhi further discussed inconsistencies and problems of the hospital before software implementation and has clarified what kind of software might be required to

overcome the hospital's problems. The presented PEMS application is able to manage the hospital activities and helps the hospital staff to replace the paper works to computer works. It keeps tracks of records and activities and stores them to a central data storage. The data storage is accessible via the network.

Doctors and nurses help the patients via this application and can store and view their treatment procedures efficiently. The application has been localized into the three languages English, Dari, and Pashto.

Transforming a Paper Based Library System to Digital in Example of Herat University



Also from Herat University, **Mr. Abdul Rahman Sherzad** presented his project of “Transforming a Paper Based Library System to Digital in Example of Herat University”. A digital library can provide access to many of the information networks around the world, which is a necessary component of almost any research experience today. Considering the facilities associated with a digital library, gradual replacement of traditional libraries by digital ones appears to be inevitable. As an important step in enhancement of education in Afghanistan, the concept of digital libraries must be introduced and integrated into the country’s rapidly evolving educational system. Mr. Sherzad's Master's thesis addresses the challenges existing in

Afghanistan university libraries. A solution for each challenge is defined by introducing digital and automated systems and finally a scheme is provided for switching from a paper-based library system to a digital library system. The presented system features a library resource management that keeps track of members, books, news, check-ins, and check-outs. A search module and detailed statistics are provided as well.

Information Management System for Lecturer Profiles in the Ministry of Higher Education



Mr. Ibrahim Sharistani from Kabul University presented an “Information Management System for Lecturer Profiles in the Ministry of Higher Education”. This system is intended to store personal information, processes of promotion and addresses of related files within the Academic Promotion Office in the Ministry of Higher Education. It accelerates the current administration tasks and makes them manageable within the Academic Promotion Office. The reason for these claims are the load of folders and documents that are compiled during the promotion procedure of lecturers from all government universities. In order to develop the system the current paper-based process and forms, which hold data related to the process of promotion, were

studied and questionnaire based interviews were conducted. The proposed Lecturer Profile

System is a web based application that is intended to store the above mentioned information on lecturers and can compile reports on this data.

Interoperability Tests with the Quagga Open Source Router



Mr. Mohammad Mussadiq Jalalzai from Kabul University conducted his research on “Interoperability Tests with the Quagga Open Source Router”. Commercial routers are widely implemented in the Internet. Commercial router vendors build proprietary routers while keeping in mind the current and future needs. But these commercial routers are expensive and inflexible. Alternatively, free open source routers are also available. They also provide routing services between networks. But they have limited performance on the top of personal computers. It is also very

important to determine if the free open source router is interoperable with other routers in the network. In the thesis of Mr. Jalalzai an open source routing tool named Quagga is considered and different tests have been performed on it to conform its basic interoperability to other commercial routers. Free and open source routing tools are used to perform all tests. BGP Timers implemented in Quagga and Quagga behavior while using these timers and features is also observed. The results show that Quagga implements entirely time driven behavior, but still by tuning BGP timers and enabling certain BGP features can have positive impact on how fast Quagga can detect a change in network and propagate information to other peers, hence making network convergence faster. Mr. Jalalzai further proposed the establishment of a Remote Network Lab. The main focus of the lab will be on providing research facilities for the computer science students and lecturers in the field of computer networks. Furthermore, this lab will be used to develop and test different aspects of free and open source routers by developing and testing network prototypes before the implementation. Such a lab is needed because of the current situation at the Computer Science Faculty of Kabul University: There is only a limited number of working network devices like routers and switches. In each class a large number of students with a limited number of devices is found. The students have to stay in the afternoon in the faculty to perform their experiments or finish their homework, which can be a difficult situation for female students. Due to the large number of users accessing and using the devices physically some of the devices got problems like short circuits, malfunctioning interfaces, or malfunctioning power supply. In addition to the research tasks, this lab will offer learning activities through the entire curriculum. All users (students and lecturers) can access the lab from anywhere in the world if they are connected to the Internet. The users have to reserve devices before using them in order to prevent the conflict or loss of data and the same user has to release the devices if he / she is done with his / her work. The reservation time will be controlled so that everybody gets equal opportunity to perform their tasks. In this lab the students will not only work with commercial routing devices, but for the first time in Afghanistan they will be able to work with free and open source routers.

Concept for an Adapted School Management System



Mrs. Humaira Akhtari from Kabul Polytechnic University presented a “Concept for an Adapted School Management System”.

The School Management System is a system that is new in Afghanistan; there is no prior investigation existing. Investigations were carried out in examining the process of several schools in Kabul city. The research consisted of four detailed interviews with officials of both governmental and nongovernmental schools. During research the present system was examined and short comings of the system were identified. A possible solution for the identified problems were suggested and a new computerized system was introduced in detail. The new

system is believed to solve all the problems associated with the current manual system. The school personnel welcomed the project and are ready to adopt to the new system. The system was designed as a web based application using the Java programming language. It is highly recommended that school administrative staff should be well trained on how to use the system. The feasibility of the project was studied and it was found that some major schools in Afghanistan are feasible for applying this system currently, whereas, minor schools with low or no computer resources are not applicable for the time being. Schools residing in farthest provinces of Afghanistan are usually not equipped with computer resources or do not have trained staff for using this system, and therefore in such schools the new system is not applicable and it is considered as the limitation of the project.

Benefits of an Open Source Based School Management System for Afghan schools



The session's final presentation was held by **Mrs. Freshta Popalyar** of Kabul University. She presented the “Benefits of an Open Source Based School Management System for Afghan schools”. Most organizations and institutions in Afghanistan need specially designed software for their work. Afghanistan being a country suffering from a weak economic situation, can not afford to answer the necessities of the governmental establishments in this regard. In such a situation when offices in Afghan organizations and institutions are mostly equipped with computers, a proper way to get the most benefit from the resources is required. This thesis has presented the open source software development

approach as an answer to the specified necessities of Afghan institutions. The purpose of Mrs. Popalyar's Master's thesis was to clarify the benefits of an open source approach for developing software for Afghan institutions.

Designing an open source software for Afghan schools was taken as an example for this purpose. The document has analyzed the current situation of school management and open

source software in Afghanistan. In addition benefits of open source software in India were explored, as an example of the benefits of open source for developing countries. The thesis evaluated the advantages of open source software and open source software development in the context of Afghanistan. It has also examined the current situation of proprietary software usage and its disadvantages for a country like Afghanistan. The advantages and disadvantages of both open source and closed source software for Afghan institutions were compared and as a result preferred open source software development as the solution of the identified problems. Furthermore an open source school management system software was evaluated and designed for usage in Afghan schools. The feasibility of the implementation of the School Management System in Afghan schools was studied in the document. Additionally guidance on research areas on benefits of open source software for Afghan institutions, development possibilities and further improvements of the project are provided. Mrs. Popalyar encourages and motivates the creation of a center for the Afghan open source community, that gathers all local Afghan experts in the field of software engineering and builds software for Afghan institutions and organizations.

Concept to Improve the Computerized Post-Examination Processes of the Concours



The session was opened by the presentation of **Mrs. Mariam Farda** from Kabul University, who presented a “Concept to Improve the Computerized Post-Examination Processes of the Concours”. The concours examination is the countrywide university entrance examination through which tens of thousands of students are selected to universities and other governmental institutions each year. Attempts started to computerize the concours examination process a decade ago. Twice it was done, however the results are not satisfactory. In her Master's thesis Mrs. Farda investigated the current system, identified the factors which negatively impacted the concours system and developed a concept to improve the computerized system

used in the concours. The conducted interviews pointed out the factors and issues existing in the current system. To support and measure the feasibility of this concept a proposed system has been developed and discussed in detail. The proposed system has gone through the full system development life cycle model, i.e. the waterfall process. The project was done through requirement engineering using the results of conducted interviews, design by using UML diagrams, implementation using open source technologies and testing using JUnit tests. The result of the Master's thesis indicated the suggested solution to answer the research question and suggestions for further improvement of Concours. The next steps to be taken within this project includes the integration with the question bank and the student registration software, which were presented in the following talks by Mrs. Farda's colleagues from Kabul University.

Concept to Improve the University Entrance Examination (Concours)



Mr. Baseer Ahmad Baheer presented the “Concept to Improve the University Entrance Examination (Concours)”. Students are admitted to different faculties in different universities on the basis of the university entrance examination. A major part of the ministry’s annual budget is spent on this activity. The number of students taking the entrance examination is more than 100,000 per year. So far, two computerized systems are implemented to handle the concours exam processes (pre and post examination processes), but both systems do not fulfill all requirements of the concours committee. The Master's thesis of Mr. Baheer is focusing on pre examination or students registration and admission processes. The - goal of the study was to improve the computerized pre-examination processes of the concours exam and thereby to provide a system which is based on elicited real requirements, to remove existing manual pre-examination processes, free of charge, with high level of secrecy, and free from any large scale human intervention.

Management System for University Entry Examination Questions in Afghanistan



Another presentation on this topic was conducted by **Mrs. Ogai Ahmadi**, who presented “A Management System for University Entry Examination Questions in Afghanistan”. In her Master's thesis Mrs. Ahmadi investigated the shortcomings of existing computer packages used for preparing, marking and producing the results of the concours examination. As a result, it has been recommended to the MoHE to develop a system using open source software for this purpose in order to produce an automated system for managing university entry examination questions in Afghanistan. The principles of such a system have been demonstrated. The functionalities provided by the proposed system prototype are storing, retrieving, editing, and deleting question sets; localization of the system interfaces; authentication and authorization; database backup and restore; statistical report generation; as well as the printing of question sheets. Currently the interfaces to the other two systems that are involved in the concours process are being programmed.

A System to Support the Transformation to the Credit Point Grading System at Afghan Universities



Mrs. Zoia Sahab from Kabul University presented “A System to Support the Transformation to the Credit Point Grading System at Afghan Universities”. Mrs. Sahab developed an IT system to support the transformation of grading to credit point grading system at Afghan universities. Higher education of Afghanistan applies two grading systems, credit point grading system and semester based grading system. In Mrs. Sahab's Master's thesis, both grading systems are surveyed. Interviews with the responsible people of the Ministry of Higher Education and the respective universities were conducted. Regarding to the main difficulties due to applying credit point grading system in higher education institutions, the requirements for an IT system are defined. According to the system requirements the conceptual and logical designs of the system were developed. The developed system supports the transformation of a semester based grading system to a credit point grading system. It makes the managing of students, students' grades and courses easier. By using the system, the credit point grading system becomes easier to understand, even to those not familiar with the credit point system. The current prototype of the server-client based system has the following functionality: management of courses, registration of students to courses, management of grades for each course, statistical calculations on the grades, automatic calculation of the achieved credits, as well as generating course and grade lists.

Concept of a Timetable and Resource Management System for Afghan Universities



Mr. Noor Mohammad Atapoor from Kabul University presented a “Concept of a Timetable and Resource Management System for Afghan Universities”. In his Master's thesis, Mr. Atapoor analyzed how to support the managerial works around the arrangement of timetables, registering official files and documents, registering students and lecturers and handling information about them. Performing these tasks with the current existing methods and approaches are considered to be time consuming, inflexible as well as accompanied with basic searching problems. Required data in the research process was gathered through interviews and questionnaires with lecturers, administrators and the faculty dean. Based on the obtained data and requirements as well as their analysis, the concept was acquired to obviate problems.

Through implementing the proposed concept, a web-based software system (TRMS) has been designed and developed to make the above mentioned work flow more manageable, accessible and flexible. The system is designed considering the model-view-controller design pattern and is utilized with open source technologies (J2EE) for its implementation. To make the system's usage more convenient, its interface has been localized into the two official languages of Afghanistan. Through providing appropriate services and functionality the system would be capable to deal with the discussed problems and facilitates the work performance for its users. The services that are provided by the developed software include: arrangement of both teaching and exam timetable, registration of newly admitted students to the university, registration of all lecturers, registration of documents for students and lecturers. Through different search interfaces information and reports can be shown on the teaching and exam timetables, the list of graduated and non-graduated students, lecturers, and registered documents. The system has been developed only for a single faculty, but in the future should be extended to cover all faculties of a university. Two months ago Mr. Atapoor redesigned the software using the technology of Richfaces. Through the AJAX support of Richfaces the usability of the system is strongly enhanced.

Developing a System to Manage Student Records at Herat University



The final presentation of the day was made by **Mrs. Fereshteh Forough** from Herat University. She described her strategy of "Developing a System to Manage Student Records at Herat University". The Student Record System (SRS) is a software project which focuses on two main parts, registration and grading. During the Master's project of Mrs. Forough, the SRS software was improved by adding new functionalities which meet the Afghan universities' requirements from a very initial part which is the student registration until making it as a web based application to access it online and make the administration work more easy, reliable, efficient and consistent for the university and faculty administrators.

The scope in which the system is going to be applied is the Student Affairs Office at Herat University and its related faculties. To have an appropriate vision of the system data the first step was to gather the needed information which was done at Herat University by gathering several registration forms and grade sheets. For applying a software system many other factors had to be considered like not having a stable electricity and appropriate place to accommodate the tools for running the system. The intention is to gain a system that could offer more facilities and comforts in the administration work and save time.

Day 3: October 11, 2010

Discussion

The aim of the final session of this year's IT conference was the discussion of the application projects that were presented on the previous day and to make suggestions towards their implementation.

Participants of the discussion were Prof. Mirza Mohammad Merza, dean of the Faculty of Computer Science of Kabul Polytechnic University, Dr. Meer Ghulam Osman Barez Hussaini, president of Herat University, Eng. Habibullah, president of Balkh University, Prof. Faizullah Habibi, president of Faryab University, Prof. Ahmad Sha Nazari, president of Jawozjan University, Prof. Kashifi Barmaki, president of Takhar University, Prof. Rahim Noorzai, president of Ghazni University, Prof. Yosuf Azizi, president of Konoz University, Prof. Mohammad Sabir Sabiri, president of Parwan University, Prof. Abdul Rashid, president of Albironi University, Prof. Abdul Qadir, president of Badakhshan University, Prof. Adina, president of Bamyan University, Prof. Obaidullah Paryar, president of Paktia University, the IT representatives of all Afghan universities, the Master graduates, representatives from international organizations, as well as the team of TU Berlin, Dr. Nazir Peroz, Mr. René Herlitz and Mr. Ralph B. Magnus.

To start off the discussion, Dr. Peroz summarized the contents of the first two conference days. The main topic of the discussion were the 25 projects that were presented on the second day. The question arose how these projects could be implemented in the environment of Afghanistan.

The first discussion covered the first session of the second day, IT policy. All participants confirmed that Afghanistan needs to have a national IT strategy. Regarding the IT curriculum, the future of Afghanistan needs to be focused, and a uniform curriculum for the fields of Computer Science and Computer Engineering need to be established at all respective faculties nationwide.

The president of Herat University argued that the curriculum elaborated for Herat University in collaboration with TU Berlin does not match all criteria regarding the maximum number of credit points for each course. Discussion participants suggested that representatives from Herat, Kabul and Kabul Polytechnic universities form a round table with the Academic Affairs Commission of MoHE to discuss these issues and find an appropriate result.

The two platforms that tackled the local languages of Afghanistan were thoroughly discussed. It was suggested to form a round table together with linguists to discuss how to best integrate the two official languages of Afghanistan, Dari and Pashto, into the higher education in order to use uniform terms in these languages in all universities instead of the different terms from different foreign languages that are currently in use.

The proposal to establish an IT research center found support throughout the whole audience.

In the current situation in Afghanistan there is often the need to evaluate and compare different IT systems designed as solutions towards a challenge in society.

The IT infrastructure is an essential part for the development of IT in Afghanistan. The discussion evolved around the power supply, backup and e-mail systems, Internet

connection, and the establishment of IT centers at each university. The main point of discussion was around the proposed e-mail system, as the solution presented by Mr. Sharifi tackled the challenge of using an e-mail system that addressed the problems of cuts in both power and Internet connection.

In the discussion part around IT administration, the systems that tackled the need for modernization of the administration were discussed. The MoHE has developed HEMIS in order to computerize the whole administration around the higher education system. The core of the discussion was the concern about the development of duplicated systems. For Afghanistan it is important that the found solutions are cost-efficient and sustainable. In the afternoon a training was given to the IT representatives of all universities on the HEMIS platform.

The last part of the discussion was IT education. At the core of the discussion was the idea of an improvement of the computer-supported concours procedures in the MoHE. The main point of criticism was that the presenters were not deeply enough informed about the whole concours process. Nevertheless the presented system gives a chance to newly think about and discuss the current systems in use. It was suggested that the three presenters sit together with the members of the concours committee in order to discuss their proposed solutions. The systems of online libraries, school management systems, hospital management systems, timetable and grading systems could not be discussed due to the shortage of time.

In the general part of the discussion another suggestion was made for the organization of the IT conferences in the following years: the date of the conferences should be announced early enough, so that universities are given the chance to contribute to the conference with their own presentations.

The suggestion for the topic of next year's conference is the foundation of a National Computer Science Society for Afghanistan.

Dr. Peroz made a final statement to the conference and confirmed that the projects proposed by the Master graduates will be supported by the German Foreign Office and the DAAD.

At the end of the conference words of thanks were spoken from Dr. Peroz towards the good cooperation with the MoHE, especially to Prof. Babury and Mr. Saay. He further thanked the World Bank for financing the concluded Master program. The presidents and IT responsables were thanked for taking the time to make the long trip from their respective provinces to Kabul. Further words of thank you were addressed to the Master graduates for presenting their projects. He further thanked the German Foreign Office, especially Minister of State Mrs. Pieper, the German Embassy in Kabul, the Afghan Embassy in Berlin, and the DAAD for their support and warm welcoming words. Special thanks were dedicated towards the two lecturers from TU Berlin, Mr. Herlitz and Mr. Magnus, who helped organizing this year's conference. Without the good collaboration between the team of ZiiK of the TU Berlin and the team of the IT department of the MoHE, which was working as hard as every year, such a conference would not be possible.

Prof. Babury thanked in the name of the MoHE to all participants, Dr. Peroz, Mr. Herlitz, Mr. Magnus, Mrs. Hoffmann, the presidents and IT representatives from the universities. At the end of his speech he handed over presents from the IT department for the team of TU Berlin.

Finally the Master graduates thanked Dr. Peroz, Mr. Herlitz, Mr. Magnus and all other TU Berlin lecturers who continuously supported them throughout their studies. They handed over presents to the TU members present and also send presents for their other lecturers, Mr. Chi-Thanh Christopher Nguyen and Mr. Daniel Tippmann. As a special surprise they invited the TU Berlin team for a closing dinner, at which the university presidents also participated.

December 18 – 20, 2011

IT Conference Part VII in Kabul

Conference topic: An Assessment of IT in Higher Education in Afghanistan and its Effects on Society

Day 1: December 18, 2011

Welcome and Opening



Mr. Sarwar Danesh, Minister for Higher Education greeted the participants and thanked the German government for its engagement in Afghanistan, especially in the area of IT. He emphasized the achievements of TU Berlin in the area of IT in higher education. He continued that the use of IT forms the development of society, but it also constitutes a new challenge. He expressed the hope that the number of currently eight public Afghan universities that have a Faculty of Computer Science will increase in the future.



Mr. Rüdiger König, German Ambassador in Kabul opened the conference, greeted all guests, and complimented the cooperation between the Center for International and Intercultural Communication of TU Berlin, the DAAD and the Ministry of Higher Education. He was pleased to have the honor to open the seventh part of the IT conference, which continues the sequence of cooperation between Germany and Afghanistan and which reflects a key aspect of the German engagement for the reconstruction – education from primary education to higher education. The conference brings together all areas that work in the area of IT. IT is an integral component of today's life, a bridge between people and necessary for all political, economic, industrial and cultural activities.



The Minister for Communication and Information Technology, **Mr. Amirzai Sangin**, greeted the guests of the conference and explained the development of IT at his ministry and in Afghanistan in general. He further noted the importance of IT for the areas of education and economy. The Minister was proud to announce the establishment of a Computer Science Institute at Kabul University. He underlined his further intention on collaboration with the MoHE.



Prof. Osman Babury, Deputy Minister of Higher Education, welcomed all guests of the conference. He stressed that the MoHE is still working on the basis of the national IT strategy and currently focuses on the following areas:

- a) Establishing Afghanistan Research and Education Network (AFREN),
- b) Supply of all universities with computer equipment and strengthening the IT infrastructure,
- c) Implementation of HEMIS, and improving of our technical and users abilities in this regard,
- d) Training of staff in the use of modern technologies.

It is the claimed goal to make accessible international knowledge to all Afghan institutions, so that every member of the Afghan universities as well as the employees of the MoHE will be capable of the efficient usage of IT systems.



The new director of the DAAD liaison office in Kabul, **Dr. Dieter Ortmeier**, greeted the guests in the name of the DAAD. The DAAD has been in Kabul since 2002 – and since 2006 in the building of the MoHE. The long-standing cooperation with the ministry, as he went on, means that the DAAD has established a bond of trust and friendship over the years. Relationships are an important factor, if you want to achieve something in Afghanistan.

Education is the foundation for fair, future-oriented and sustainable development, democracy and peace. The country has been changing so fast and there is an unbelievable energy and spirit of renewal among the people.

He emphasized that the DAAD will be engaged in Afghanistan over the long term – even after the handover of security responsibilities in 2014. DAAD has supported academic exchange with Afghanistan and the Afghan universities since the 1960s. And this will not change in the future.

He expresses his thanks to Dr. Nazir Peroz and his team from the Technical University of Berlin for shaping the IT landscape here in Afghanistan fundamentally for the last 10 years. He considered the bright promise of Afghanistan's future. The hard times that exist cannot be ignored. Many Afghans are struggling to pay the rent or the mortgage, to find a job, to feed their families. The road ahead will not be easy, but the German-Afghan journey that has been taken together over the past five decades – and in particular over the last ten years – fills him with optimism for the one that now lies ahead. Working together on the rebuilding of Higher Education in Afghanistan, as he explained, results have been created that one can be proud of. Higher Education is a big step towards peace.

Keynote Speeches

Apart from the greeting words, two keynote speeches on the topic of IT were held on the first conference day.



The first keynote by **Mr. Salim Saay**, director of the IT department of MoHE, was on the current situation of IT and its effects on higher education in Afghanistan. In his speech Mr. Saay gave an overview on the current IT supply at Afghan universities. He said that the development of IT has progressed at a vast pace. He demonstrated this with the example that ten years ago the total number of computers at Afghan universities was between 5 and 10. He was happy to announce that the current number of computers is more than 3000 and that all of them are connected to the Internet. Ten years ago, no one in Afghanistan even knew what "Internet" means, today all Afghan universities have Internet access. Ten years ago the Department of Computer Science at Kabul University had four lecturers, no power supply and no books for the 20 students, which were enrolled at the time. In the meantime the former department has become the Faculty of Computer Science, with 22 lecturers and 500 students. Further three Faculties and more Departments of Computer Science at Afghan universities have been founded since then. Since Afghanistan has long been cut off from this development, these numbers are still not sufficient.

Apart from the construction of IT infrastructure and the usage of IT, possibilities should be created on how further benefit can be generated from the IT usage for the universities and for Afghanistan. Guidelines, laws and structures are necessary for that purpose. Currently the usage of IT is often implemented as single projects rather than aiming for a holistic IT structures on a broad societal basis.

But even with the above mentioned obstacles the MoHE and the universities in support by their international partners were able to reach a modern standard and high-level tertiary education within a short time-span. This was accomplished by the establishment of computer systems in the area of higher education (HEMIS) and its usage in universities, the establishment of a structure for research and education (AFREN) and the extension of knowledge in the area of IT, among others. These tasks are also noted in the strategic plan of MoHE.



Dr. Nazir Peroz, director of ZiiK at TU Berlin, described in his speech how the usage of IT creates a challenge for Afghan society. He stressed that this challenge makes necessary the development of certain measures that coordinate and steer the procurement, the usage, the running, the support, the service, and above all the training in the area of IT. Among the most important measures are a sustainable IT planning, a solid IT infrastructure, a demand-orientated IT education and a modern management as well as sufficient financial means. The implementation of these measures on the other hand requires a judicial and political frame, competencies and responsibilities. If these structures are not being established soon, isolated solutions of different IT projects will be the result. These will afterwards lead to more disadvantages than advantages in the Afghan society. At the end of his talk he presented four precise fields of action, which are important for the development and the usage of IT in Afghanistan: 10 to 15 years of IT education programs, Development of an eGovernment considering the Afghan culture and the available resources, establishment of a technology park for Afghanistan in order to support Afghanistan's IT and

to create jobs, and finally the foundation of an IT society, which will consult the government, analyze the IT demand of the country, develop and propose IT curricula, et cetera.

Day 2: December 19, 2011

Morning: Introductory Speeches

The second conference day began with four introductory speeches. The selection of presentations had been organized by MoHE. A call for papers had been published and had called for abstracts on proposed talks to be submitted to the IT department of MoHE by members of the Afghan higher education system. A scientific committee consisting of members of MoHE, Kabul University, and TU Berlin had selected the presenters based on the submitted papers. The transcription of the speeches can be found in the appendix of this report.



The first talk was held by **Mr. Hadi Mohaqeq**, lecturer at the Faculty of Computer Science at Kabul Polytechnic University. His talk was on the role of IT in the establishment of Afghan public organizations. He emphasized on the structure of administration and its challenges and described each one together with their respective responsibilities. He stressed that corruption within the Afghan administration has increased. In order to hinder this problem on expanding further, a modernization of administration through the use of IT is of big importance. *The transcription of the talk can be found in attachment 1 of this report.*



The consequent talk was presented by **Mr. Mohammad Hadi Hedayati**, lecturer at the Computer Science Faculty of Kabul University, on the significance and effects of IT for Afghan economy. The spread and usage of IT does not only play an important role in the administration, but also in economy, like eBusiness for example. By presenting a few examples he showed how different large foreign companies can increase their economic power through the use of IT. *The transcription of the talk can be found in attachment 2 of this report.*



Mr. Shafi Tohki, lecturer at the Faculty of Computer Science at Herat University, talked about “Open Source and Open Learning in academic institutions”.

In his speech he first summarized the significance of open source and described a number of basics and practices, which enable the support of access to development and production of open source solutions. He described several application areas, which are based on the philosophy of open source, e.g. an open source curriculum, open source science, distributed and reusable data and open source administration and governance. Apart from advantages of open source, he also mentioned from difficulties which result for Afghanistan: because of a lack of resources, a lot of important applications are not being used by university employees (professors, lecturers, and students). *The transcription of the talk can be found in attachment 3 of this report.*



The concluding speech was held by **Mrs. Fereshteh Forough**, lecturer at the Faculty of Computer Science of Herat University. She talked on “Thin Client Technology in the Academic Environment for Developing Countries”. She began by explaining the term thin client and introducing the problems that appear due to the increasing number of PCs at Afghan universities and the resulting additional costs. This problem can be solved with the help of a thin client concept. Such a concept is in successful operation at Herat University. *The transcription of the talk can be found in attachment 4 of this report.*

Afternoon: Working Groups

After the presentations, three working groups were formed for the afternoon: ***IT in Society***, ***IT in Economy*** and ***IT in Education***. The talks in the morning were meant as an input for the discussion in the working groups. The goal of the working groups was to work out measures for possible development goals.

Working Group „IT in Society“



Within the working group “IT in Society” new ideas about the important role of IT in Afghan society were discussed. The question arose on how the consciousness of the Afghan population can be raised about the chances and risks, which new technologies like social networks can bring. With a focus on Afghan culture there was a lot of talk about Afghanistan being a multilingual country without this fact being reflected in IT applications. Also Afghanistan's cultural heritage and history are important for all Afghans and IT could be used for to raise

information and awareness in the population.

The working group first did an analysis on which stakeholders could be involved. The result named the Ministry of Higher Education, the Ministry of Communication and Information Technology, and the Ministry of Information and Culture as important examples of government actors. On the other side non-governmental organizations such as the World Bank, the UN, DAAD, the different embassies and government donor agencies were listed.

Working Group „IT in Economy“



The participants of the working group “IT in Economy” debated about the significance and the possibilities of IT in Afghan economy. Central point of the discussion was how the Afghan youth can be prepared for the IT labour market and how the Afghan economy can make the step from using IT to the development and production of IT applications. It was discussed how a separation between academic education and on the job training can be achieved. Both are important, but so far there is no real distinction being made at Afghan

universities. Research should receive more funds. In this field it would be interesting to cooperate with Afghan companies.

Nevertheless, the challenges are huge. There is still no reliable power supply at the university and in the country and a reliable IT infrastructure is not available. The security situation in the whole country makes long-term planning almost impossible.

Working Group “IT in Education”



In the final working group “IT in Education” there was a discussion on the different types of IT training that are necessary in Afghanistan. The discussion was mainly on qualified IT training like IT administration, IT applications, and academic IT education.

The representatives of the universities discussed mainly about the challenges and the status quo at the Afghan universities. The situation is very different at the various universities across the country. Some universities have computer science faculties and are implementing IT projects at those faculties. A stable power supply and above all an organizational IT structure is still lacking at the universities. Furthermore there are still no funds (*tashkeel*) for IT salaries available. Therefore universities cannot employ IT staff currently. If there is budget available for the purpose, it is nevertheless difficult to find appropriate staff, because of the low availability of IT specialists and the low university salaries.

An important topic in this working group was the establishment of partnerships – on the one hand with companies, but on the other hand, also with other universities. Focus of the partnerships should be the building of capacity through Master- and PhD-programs and the resulting perspective on scientific research.

As a side topic, eLearning was discussed. IT provides new possibilities to deliver educational material. Nevertheless the participants gave more importance to the curriculum, the academic exchange with foreign partner universities and the establishment of research institutions.

Day 3: December 20, 2011

Final presentation



On the last conference day the three working groups presented their results and elaborated proposals for future development.

The results of the first working group **“IT in Education”** were presented by Mr. Akmal Yaqini, IT director at Kabul University. In order to guarantee a sufficient flow of new young academics, the group point out the importance of a three-staged computer science education in the country – Bachelor, Master, and PhD – based on a ten-year development plan.

During the working group it was pointed out several times that a separation of computer science as an academic field and IT as a vocational training is necessary. Mr. Yaqini presented the IT policy of Kabul University which is currently being drafted with the goals of connecting all faculties and office to the fiber-optic network, a suitable networking monitoring and bandwidth control at the faculties, in order to supply a stable Internet connection. Troubleshooting of network equipment must be guaranteed on the whole campus. This means that guidelines and work flows for planning, design and implementation of IT need to be developed. This will be the basis to be able to provide an IT infrastructure that can be used for research purposes as well.

The working group pointed out that such a project cannot be implemented without support. There is a necessity of an IT budget (*tashkeel*), a stable power supply. Partnerships and exchange programs with foreign universities and a goal-orientated cooperation with private companies are of utmost important to support young academics.



The results of the working group **“IT in economy”** were presented by Mr. Saeed Ahmadi, computer science lecturer at Kabul University. He started by presenting some projects in the area of IT in Afghanistan, that were discussed in the working group, as the establishment of computer science faculties, eBanking and mobile banking applications, local mobile telecommunication carriers as well as the connection of Afghanistan to the Internet through fibre-optic cables. Now steps must be made and the focus needs to be put on the generation of IT specialists, the supply of IT services in the private and public sectors, the support of ICT start up companies and the establishment of support centres. Also here education

was one of the main focus points. A unified computer science curriculum, qualified training programs for IT administrators and IT technicians have to be developed of – if already available – need to be implemented. Furthermore there is the need for an evaluation of the demands of the Afghan society. It should be analyzed how open source software could be used more effectively. Currently the majority of the Afghan population is using IT only on a user basis. Thoughts need be put on possibilities of transforming the users to developers.

He further stressed that the government must urgently form a legislative frame for the Afghan economy. This means IT laws as well as a functioning tax law. An IT society should be formed, that links the private IT companies to academic education. This IT society could also reach into other sectors of

Afghan society. He demanded to give a decisive voice to local experts in national ICT projects, especially to the young generation.



The results of the final working group “**IT in Society**” were presented by Mr. Naweed Rahmani, lecturer at the Computer Science Faculty at Balkh University. Mr. Rahmani stressed the richness of Afghanistan in its number of languages as well as the rich cultural heritage. He pointed out that the group debated extensively on the influence of IT on the different aspects of society. IT should be used more to develop a consciousness for the country, and the conservation of its culture and languages. The languages spoken in Afghanistan should be used more extensively in software products by localizing them to these cultures. For example, a platform should be established that will present the culture, history and cultural heritage of Afghanistan to tourists.

Localization of software will make it easier for the population to use the services of public institutions and thereby extend the use of eGovernment applications. Furthermore employees must develop a consciousness on how to deal with technical security. The use of IT can lead to more transparency and thereby influence positively the development of corruption and distribution of power. The best solution would be the foundation of an IT society that makes IT questions and problems transparent to the society and develops solutions jointly with the politicians, in order to reach a functional and usable IT supply which is benefitting the whole Afghan society, political institution, and the economy.

Furthermore the strengthening of *good governance* in Afghanistan was discussed. In this development, IT plays an important role to link government institutions with its subordinate institutions. The administration and work flows of the different institutions should be digitized and employees should be trained on the use of IT resources.

Conclusion



The final discussion was moderated by Prof. Babury, Deputy Minister of Higher Education, and Dr. Peroz, director of ZiiK at TU Berlin. After the presentations of working group results, all participants had the possibility of putting questions to each working group. Topics in the discussion were the demand of IT at universities and the use of open source. The latter has been demanded and supported and at some universities

deployed and implemented through TU Berlin since 2002. After a lively discussion about the different IT situations at the respective universities, the topic turned towards the foundation of an IT society in Afghanistan. The foundation of such a society was proposed by Dr. Peroz and strongly agreed upon by the participants. Prof. Babury picked up this proposal and seconded it in his final speech of the conference with the words: *“With the foundation of an IT society for Afghanistan, a milestone will be set in the development of IT in Afghanistan”*. Dr. Peroz remarked: *“Plant a tree today, and one day you will harvest its fruits”*. This project was welcomed by all participants and the basis for the foundation was laid during the conference under the hospices of Deputy Minister Prof. Babury. Mr. Saay proposed to form a working group that will form and actively support the progress of the society. The group should consist of representatives of the Afghan computer science faculties. In the closing moments of the ceremony, Prof. Babury thanked all conference participants and pointed out the well functioning cooperation between ZiiK at TU Berlin and the IT department of MoHE.

December 18th to 20th, 2012

IT Conference Part VIII in Kabul

Conference topic: Current situation and perspectives of IT

Day 1: December 18, 2012

Welcome and Opening

Message from President of the Islamic Republic of Afghanistan, H.E. Hamid Karzai



Subsequently, **Prof. Dr. Gul Hassan Walizai**, the Deputy Minister for Higher Education, read the following message of His Excellency Mr. Hamid Karzai, the President of the Islamic Republic of Afghanistan to the guests of the 8th conference on IT for Higher Education in Afghanistan:

“The current development of IT is a very important achievement in the sector of science and technology in the world, which has provided for much facilitation to our day-to-day lives.

IT is a new phenomenon in our country, but the new Afghan generation has showed their talent and has proven expertise in the field of IT. We all appreciate this.

Furthermore, IT training is in progress at Afghan universities and higher educational institutes, it is developing and expanding from day to day.

We thank the TU Berlin of Germany for their assistance and cooperation in the development and training of IT at Afghan universities.

The TU Berlin assisted the MoHE and the Afghan universities, and their cooperation is still in progress and in the state of expansion. Special thanks go to the MoHE for organizing this valuable 8th IT conference in cooperation with our German friends.

I wish your conference success and God's blessings.”

Hamid Karzai
President of the Islamic Republic of Afghanistan
(translated from Pashto)



Prof. Dr. Obaidullah Obaid, Minister for Higher Education, welcomed the Deputy Minister from the Ministry of Communications, the representatives of the German Embassy in Kabul, the presidents and lecturers from the Afghan universities and all guests to the 8th conference on IT in higher education.

First, he expressed his thanks to the guests whom he considered a valuable enrichment for the conference. As the title suggested, it was the goal

of this conference to analyze the current IT situation and from these results, create a perspective for the future. To reach this goal, a close collaboration during the conference is required, as he stated. IT nowadays has a great global impact and without it, nothing can be achieved anymore. Particularly in the area of higher education this is very important, as he explained, so that the students can benefit from it, he added.

Prof. Obaid stated that Afghanistan suffered heavily during the years of war, and that it is now the time to modernize and support the country so that it can compete with other countries in the world. He remarked that this 8th IT conference is part of a series of conferences at the MoHE which had many successes in this area since 2002.

This year, as he explained, an IT Board has been founded to successfully coordinate all IT projects. With the HEMIS project, he stated, the MoHE has created a network to modernize the administration and to facilitate video conferences. Each week, two video conferences are held with Afghan universities in the provinces. According to him, the MoHE estimates that Afghanistan needs 50 PhD and 500 Master graduates in the area of computer science and IT until 2020. He concluded that in the future he would like to strengthen the contacts with the international academic partners with the help of video conferences in order to benefit from their successes.



Eng. Baryalay Hassam, Deputy Technical Minister of Communications and Information Technology (MCIT) stated that he is proud to have such an academic conference in Afghanistan. Today, Technology plays a big and important role in people's daily life, as he went on. The Ministry of Communications and Information Technology initiated a lot of developments in Afghanistan during the last years, one of them was the training of academics and experts in the field of IT.

Additionally, the Ministry of Communication and Information Technology nowadays connects approximately 85% of the people with mobile phones, manages 3G licenses for four communication operators and licensed the use of WIMAX for some companies, as he stated. He continued to explain that his ministry has important programs for Afghanistan. With projects such as "Mobile Platform" or „Mobile Government“, MCIT has planned to create a culture of innovation in the country. Under this program, awards will be given to students and organizations for developing applications which will benefit society. Additionally, the MCIT would ready to help the MoHE in connecting the universities, a way for the students to gain access to IT has to be paved, and talented students who have innovation in mind should be supported, he claimed.

Furthermore, MCIT has launched a skills development program in the country, under which job-oriented IT trainings on an advanced level will be provided. According to Mr. Hassam, it is planned to train 1500 IT professionals through these bridging programs.

He concluded that with these mentioned projects, the MCIT aims to expand broadband connectivity, mainstream the use of mobile applications across the government and develop the capacity of the IT sector to facilitate improved service delivery across Afghanistan, accelerating job creation and economic growth.



Mrs. Sandra Wassong, representative of the German Embassy in Kabul welcomed the Excellencies, professors, teaching staff of the universities, students as well as all the other guests:

“On behalf of Mr. Oliver Owcza, Deputy Head of Mission, who could unfortunately not be here today, it is my great pleasure to greet everyone participating in the 8th International IT Conference and to say a few words.

First of all I would like to thank Dr. Nazir Peroz for organising this IT Conference in Kabul which is devoted to the issues of IT.

Honourable Dr. Nazir Peroz since 2002 you have been acting as IT-coordinator of the German Academic Exchange Service.

You are the Head of the Centre of International and Intercultural Communication at the Technical University in Berlin which serves both as a platform for the exchange of information and as a centre for the annual training courses.

The result of your tireless engagement shows that you have been successfully working on a sustainable concept for the improvement of IT provision in Afghan universities as well as on curriculum development.

The first university with a modern IT Centre was Kabul University in 2003. Since then the number of IT-faculties in Afghan universities has grown to eight. An IT Department was also established at the Ministry of Higher Education in 2004.

Of course it's not just modern infrastructure and efficient technology that is needed - training is also essential.

To address this need for training, intensive summer and winter training courses at the Technical University of Berlin have developed the expertise of students, administrators and technicians.

In 2010 the first 24 lecturers returned successfully from Berlin to Afghanistan with a Master's degree. In 2011 another 24 candidates took up their studies at TU Berlin and are expected to return with a Master's degree in 2013. They return to Afghanistan as multipliers.

These are examples of just some of the many achievements that have been realised at the infrastructural, technical and educational levels.

This conference represents an important opportunity for Afghanistan - the experts and the stakeholders - to meet, listen, discuss, share information and ideas and to plan for the future of higher education.

At the same time, it also serves the purpose of expanding and strengthening Afghanistan's network of IT professionals.

Germany and the German Embassy support your activities in this field and I hope you will find an enriching experience, and I wish you all great success in your endeavours.

Keynote Speeches

On the first day of the conference, in addition to the opening speeches, three keynote presentations were given on the subject of IT.

IT Development in Afghanistan: Changes and Challenges

Dr. Nazir Peroz, Head of the ZiiK at Technical University of Berlin



In his presentation **Dr. Peroz** described how IT could be used to establish wealth, security and stability within the Afghan society. He stressed that since 2002, IT is on its way into the Afghan society. It has influence on science, economy, education and government and is changing administrative work flows, planning and everyday lives. In the 1970s, 80 % of Afghanistan's economy has been relying on agriculture. Due to globalization, the service sector is expanding, which has also an impact on Afghanistan. He claimed that the country needs to be prepared for this, as these changes pose a massive challenge for Afghanistan. According to Dr. Peroz, the following questions need to be answered to master this challenge:

- Can the Afghan society cope with this change?
- Which resources are available and which are required?
- How to protect Afghanistan from national and international attacks on the infrastructure?
- How to make use of the energy and potential of the young generation as resources for development?
- What does the Afghan government expect from this development?
- How to design and realize IT projects?

Answers to these questions, as he explained, need to be found in the scope of discussions about strategy development in the near future. For the realization of this strategy, education in different forms is essential (IT training, training of IT professionals and academic education like Master and PhD degrees in computer science). Furthermore, he stated that a well-defined process needs to be developed which takes into account different phases for the realization of projects:

- Initialization phase: In this phase, a team consisting of qualified members needs to be built by the responsible organizations or institutions.
- Strategy phase: Here, an analysis and definition of goals needs to take place.

- Conception phase: In this phase, the requirements of the project are to be formulated and technologies selected, a detailed concept developed and comprehensive documentation written.
- Test and startup phase: Finally, the project needs to be tested and implemented.
- These phases also depend on functioning, sustainable and secure network infrastructures, funding and coordination which need to be realized, as he concluded.

Development of IT structures at the MoHE

Mr. Salim Saay, Head of the IT department at the MoHE



Mr. Saay gave an overview of the development of the Ministry's IT administration. He started by pointing out the considerable progress that has been made during the last years. The severe lack of equipment and financing when the IT department was founded in 2004 could be overcome through efficient planning and acquiring funding from different international partners.

He continued to summarize the achievements of the IT department: Between 2004 and 2008, a local telephone system and LAN was implemented, three conferences on IT were organized and IT support for the centralized concourse examination was developed. Then in 2008, with the support of the TU Berlin and USAID, an IT Board was

established and a central IT strategy for Afghanistan was been developed. According to this strategy plan, as he went on to describe, the IT department was restructured and the financing for new staff both in Kabul and at the universities was acquired. To improve the IT supply in Afghanistan the department worked in mainly three areas: network infrastructure, student information systems (SIS) and training for employees of the MoHE.

Mr. Saay remarked that the tasks of the IT department at the MoHE can be divided into two groups: On the one hand, ongoing activities have to be managed and maintained, like capacity building at the universities, network management, online resources etc. On the other hand, the development and implementation of new projects is undertaken.

He finished with a brief introduction to the three current main projects:

1. "Afghanistan Research and Educational Network" (AfREN), which is realized in cooperation with the MCIT. Two workshops with international experts have already taken place and the first of four implementation stages is completed.
2. "Higher Education Management Information System" (HEMIS), the system is already completed and currently in testing and deployment phase.
3. The "Silk Afghanistan" project was initiated for 18 universities and four new universities recently joined.

Analysis of the IT Situation at the Afghan Universities

Mr. Akmal Yaqini, spokesman of the IT Board of the MoHE



Within the scope of the 8th IT conference, the spokesman of the IT Board of the MoHE, **Mr. Yaqini**, presented the role of the IT Board. Furthermore, he presented the results of a survey he performed among Afghan universities about the current IT situation:

1. Presentation of the IT Board of the MoHE: The IT Board has been founded for the coordination and supervision of the IT projects of the MoHE. Also, it has the task to develop IT policies and IT strategies and to plan its realizations in order to create a secure and sustainable IT supply in Afghanistan. In his presentation, he presented the particular tasks

of the IT Board in detail. For this propose, an IT Board has been established under presidency of The Minister of Higher Education, Prof. Obaidullah Obaid, and with membership of Prof. Osman Babury, Dr. Nazir Peroz, Prof. Hassan Adelyar, Mr. Ahmad Jawed Rasooli, and Mr. Yaqini. He explained that the Board will provide good services, ideas and suggestions and is to prepare IT strategies for education centers, as well as work on curriculum development and establish infrastructures (Internet, power supply) and more.

2. The current IT situation at the Afghan universities: Mr. Yaqini stressed that one of the first tasks of the IT Board was to find out about the IT situation at the universities with the help of a survey and to check how many faculties, departments, lecturers, students etc. there are at the universities and how many among them are women. Further aspects, as he went on, describe the situation at the universities regarding buildings, furniture, power supply, Internet connectivity, campus network connections etc. According to Mr. Yaqini, the results are very diverse. Also, it has been asked whether the universities have structures and employees who are familiar with IT and what their level of expertise is.

Mr. Yaqini closed his speech by stating that further steps of the IT Board are to create a well-designed, demand-oriented planning for the realization of the IT at the Afghan universities.

Workshop Organizations

Mr. Salim Saay, MoHE Kabul and Mr. Ralph B. Magnus, TU Berlin



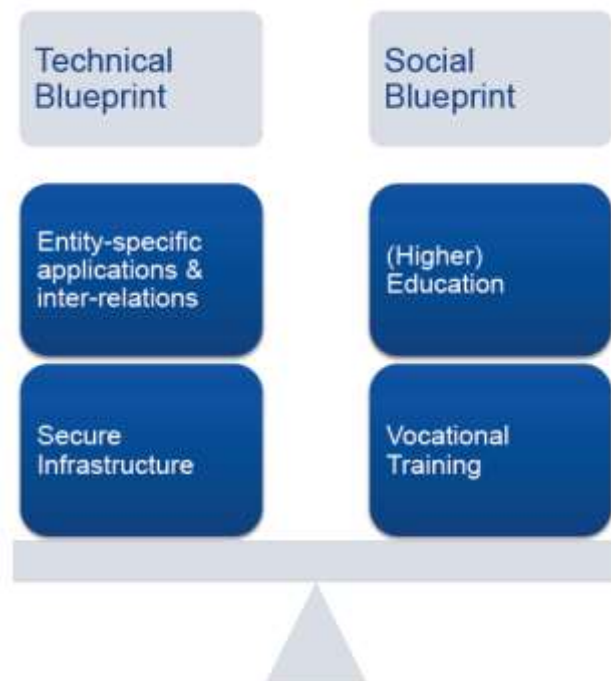
The participants of the conference were kindly asked to choose one of three workshops to participate in and to work on a particular topic in a concentrated way.

The topics of the workshops have been chosen to cover different aspects of IT in higher education and to finally provide an individual blueprint for further action. One category is dealing with social aspects and another is characterized by technical questions and concepts. A third workshop is to deal with Information Technologies in the context of vocational and higher education, which are both prerequisites for a sustainable

establishment of technical infrastructures and the implementation of entity-specific applications and their (often very complex) interrelations.

To achieve the most sustainable and self-steering impact out of all efforts, all of these aspects have to be considered in a very balanced way. If one of those aspects is treated less, there will be unpredictable unbalancing effects that will affect the whole process in general.

Each workshop has been divided into blocks of selected presentations and postponed discussions from the previous conference day. The goal has been to jointly define blueprints for the individually targeted aspects. The outcomes of each of the workshops were to be presented on the third day of the conference.



Day 2: December 19th, 2012

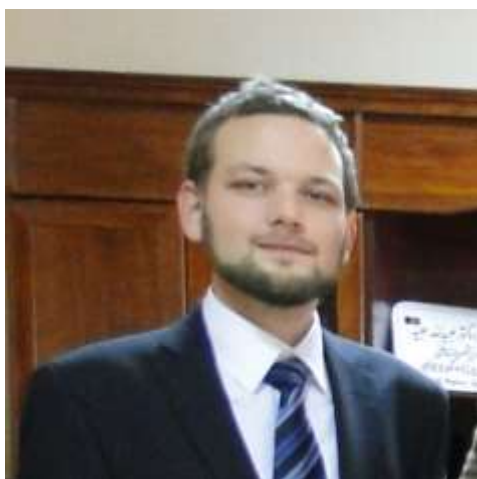
Workshop: IT Education: Challenges and Perspectives

Moderated by: Mr. Abdul Rahman Sherzad, Herat University

Opening by: Mr. Tilman Schieber, TU Berlin

Introduction

Mr. Tilman Schieber, TU Berlin



After welcoming the participants **Mr. Schieber** gave a general overview of the interaction between higher education and Information Technology. He stated that, on the one hand, IT can catalyze and enable societal change by changing the paradigms of teaching and education. On the other hand higher education needs to teach IT specialists both in the vocational and academic fields to cater to the needs of the society. He suggested that these aspects should be seen in context and guided by a unified strategic plan to benefit from synergy effects. Mr. Schieber then introduced the contributions to the workshop by showing how they fit into the overall strategy for IT in higher education in

Afghanistan, and shortly summarized how they will outline the challenges and show solutions in their respective field. Then Mr. Abdul Rahman Sherzad took the word to welcome the participants and introduce the first speaker.

Educational Data Mining

Mr. Mirwais Tanai, Sheikh Zayed University in Khost



Mr. Tanai showed an example how computer science can be used to gain insight into the challenges of higher education in Afghanistan. He presented his work on using data mining on student data. Trying to answer primarily the question why students are flunking out of university, he compared experimentally different attribute selection methods. After explaining the basics of data mining and introducing different methodologies, he showed his experimental results. These included an evaluation of the different algorithms' applicability to the problem and some correlations his analysis

shows, e.g.: students whose instruction language is different from their mother tongue are in the group of students who receive an average grade worse than B. Mr. Tanai offered the methods of data mining as a new mechanism of feedback in higher education and explained how these methods can be used to gain new insights about the challenges faced by Afghan students.

IT Curriculum

Mr. Hassan Adelyar, Kabul University



Prof. Adelyar from Kabul University gave a presentation on the process of curriculum development in Afghan IT education. He started with the definition of a curriculum: It consists of everything that promotes learners' intellectual, personal, social and physical development and includes approaches to teaching, learning and assessment. He argued that a curriculum for IT in higher education should therefore be flexible and provide a strong basis for higher degrees, encourage research, and satisfy the needs of the country and market. To achieve this, a systematic approach was introduced by Mr. Adelyar which consists of five different stages:

1. Consider the available personal and infrastructural resources including those offered by national and international co-operation.
2. Specify action fields according to the country and/or market need: For computer science, those can be software engineering, network administration, web development, databases, teaching and researching.
3. Divide each action field into competences, which are the abilities to successfully meet complex demands in a particular context. For software engineering this could be for example: problem specification, analysis, design techniques, implementation and testing and maintenance.

4. Divide the competences into courses or modules. These courses should contain basic knowledge, supporting knowledge, advanced courses and elective courses. They should emphasize underlying and enduring principles rather than details of the specific tools.
5. Distribute the courses to semesters. A good curriculum is characterized by the proper order of courses and their logically sound relationship to each other.

Mr. Adelyar concluded with an overview of the current situation of curriculum development in Afghanistan and outlined the further steps to be taken towards a unified IT curriculum.

Distance Learning in Education

Mr. Ashuqullah Alizai, University Herat



The contribution by **Mr. Alizai** set out to analyze how distance learning solutions can overcome problems of the education system in Afghanistan, which he described to be inequalities of education level, limited access to education resources, high cost of quality education, and outdated structures. As a type of learning that takes place with the instructor and learner(s) in physically separate locations, it has the potential to generate new patterns of teaching methods and reduce geographical barriers. It also gives access to higher education to those who are not able to physically attend courses on a campus for personal or

professional reasons. Mr. Alizai then gave an overview of the different forms distance education can take and showed its respective advantages and disadvantages. He continued to point out the potential of distance education for Afghanistan as a special case, emphasizing the shortage of educational resources that prevents a lot of undergraduate student from receiving a higher education. Furthermore, there are no facilities for people with physical disabilities, excluding this group completely from higher education. Finally, for cultural and traditional reasons, many Afghan women are not allowed by their families to visit an university campus, a problem for which distance learning shows potential as well. Mr. Alizai proceeded to contrast this potential with the challenges distance education is facing in Afghanistan:

- Infrastructural problems, like power supply, high Internet cost & low bandwidth
- Lack of basic IT knowledge to use distance learning facilities

He pointed out that these challenges can be overcome by developing distance learning concepts that are tailored to the needs of Afghanistan and do not just uncritically replicate solutions from other countries. The infrastructure and experience from the universities should be used as a basis instead of creating duplicate structures with the limited resources available in Afghanistan.

IT Education in Afghan Schools

Mr. Sayed Ahmad Abdullah, Kabul Education University



The contribution by **Mr. Sayed Ahmad** focused on IT in primary and secondary education. He put it into context by emphasizing that higher education depends on a reliable foundation of skills built in school. He is currently working on a project to analyze the situation of IT education in schools, examine the current problems and shortcomings and develop ideas to overcome them. In this presentation, he showed the preliminary results of his research, focusing especially on the information collected empirically. First, examples of teaching material used in IT classes were shown and Mr. Sayed Ahmad gave an overview of the contents taught and the syllabus currently used in schools. He

reported that it had proven difficult to obtain reliable data about the actual quality and success of IT education in schools: permissions of respective authorities were hard to get and most information could only be glanced through informal interviews and first-hand observation. However, some glaring problems presented themselves in the sixteen schools visited by Mr. Ahmad: Only one out of 30 IT teachers was an IT professional and only five of them had email addresses. A computer lab was available in ten of the sixteen schools, averaging to about 15 computers each. The presentation concluded with the observation that the situation could be improved by investing into better training for the teachers while reassessing the current curriculum and working on a better cooperation with stakeholders in higher education: On the one hand, expertise and knowledge offered by the universities can improve IT education in schools. On the other hand, a good IT education in schools will prepare the ground for successful careers as computer scientists or IT professionals and provide basic IT knowledge to all students.

Aryana Encyclopedia – The Online Encyclopedia for Scientific Terms

Mrs. Seema Azimi, Kabul Polytechnic University



The next presentation by **Mrs. Azimi** introduced the scientific online encyclopedia named "Aryana Encyclopedia for Scientific Terms" that she started as her Master's project in 2009. It focused on a new version that was developed in 2012, based on additional requirements and adding new features. Mrs. Azimi stated, that languages are an integral part of a country's identity and the most effective way of cultural expression among societies. The main goal of her project was to introduce ways to facilitate the development and enhancement of Afghanistan's two official languages: Dari and Pashto.

The Academy of Sciences of Afghanistan is the highest official scientific center in the country.

The Encyclopedia Department at the Academy is to finalize the 6th and last volume of the General Encyclopedia, which is considered the richest and most reliable scientific source in Afghanistan's official languages. With each volume consisting of over one thousand articles, the encyclopedia has become expensive to publish and to purchase, big and heavy to carry, and time consuming and inefficient to look through for terms. These obstacles have led to a lack of use of it and an increased usage and introduction of foreign terms into these languages has become habitual and cultural; whether in scientific areas or in daily life conversations.

Mrs. Azimi's project tries to address this problem by developing an online encyclopedia. It allows efficient navigation through an online search interface categorized into 24 scientific fields. The article shown as a result of the search contains a full description in Dari, related illustration and a ranked list of related articles.

Furthermore the online encyclopedia system provides a forum interface which lets the members of the Academy advertise terms and collect articles which are written and posted by specialist members in each field. Mrs. Azimi emphasized that populating the encyclopedia requires attention and continuous contribution from members, whether professors/lecturers from universities, scientists, or researchers of any field. She concluded her presentation by talking about the current status of her project: The development is completed and the domain aryanaencyclopediaac.gov.af has been purchased by the Academy. It is previsionsed to go online by the end of January 2013. Its goal will be ultimately to provide a reliable and easily accessible online resource for university students and lecturers to research more efficiently and productively in their native languages.

Discussion

After the presentations, a discussion moderated by Mr. Sherzad and Mr. Schieber started. First, questions and general comments on the different contributions were heard and debated.

The topics of distance learning and IT education in schools turned out to be the most controversial and interesting to the participants. For this reason, two groups were formed to collect ideas and formulate an action plan respectively. Each group discussed for forty minutes and then presented the results. Another round of discussion with all participants ensued.

Mr. Schieber then summarized the opinions and conclusions of both groups and remarked that those two topics should not be seen in isolation but have to be integrated in the existing plans and concepts in the field of higher education. This led to a discussion of the most prominent challenges for IT education in Afghanistan, ranging from the establishment of a CS master program to the coordination of scholarships or Afghan students. The workshop was concluded by Mr. Schieber and Mr. Sherzad, who collected the different conclusions and statements that were presented on the following day.



Workshop: IT in Administrative Processes – A Blueprint for the Future

Moderated by: Mr. Ahmad Jawed Rasuli, Kabul Polytechnic University

Opening by: Mr. Ralph B. Magnus, TU Berlin

Introduction

Mr. Ralph B. Magnus



Mr. Magnus welcomed all guests and the participants of this workshop. The goal of this workshop was to formulate an action plan that should enable all involved parties to jointly establish a sustainable IT environment for administrative support in higher education with a long term scope. Mr. Magnus emphasized that administration in the context of higher education is a very complex topic which has to deal with a huge set of very different and individual tasks. A common system to cover all these needs and requirements has to be planned well and in a modular and flexible way. Also there are many roles and different organizational units involved that have to be considered as potential target groups. According to him, a big challenge is to identify the relevant roles and to clearly encapsulate the access to the system's information. Another big task is to keep data which can be shared between participating organizations synchronized throughout the system.

While the technically oriented questions have been covered by the individual talks and the related discussions, the overall goal of this workshop was to find a way to bundle all ongoing efforts to define and setup a unified approach for the mentioned tasks.

National Research and Education Network – Backbone of Sustainable Management Systems

Mr. Hamid R. Mohmand, Herat University



Mr. Mohmand started by explaining that the important point is the data inside a network and that in order to keep data save and intact, a number of steps have to be taken. As an illustration, he pointed out that on a single computer, data could be kept save just on this computer, but if it would be extended to connect to a LAN, MAN or WAN, then a focus on security would become necessary to keep the data safe in different networks. For building an Afghanistan Research Center, as he went on, it would be important to focus more on security, confidentiality, integrity and availability of data.

He added that the Afghanistan Research Center should be connected to national and international networks. He mentioned that he wrote all necessary points about the Afghanistan Research Center in a paper to provide for more information and suggestions about this topic. Mr. Mohmand gave the examples of India (ERNET) and Africa (SANREN) to demonstrate how these projects deal with challenges and problems, what kind of technologies they used, which way was easy and secure for them to build and implement a national and international research center.

HEMIS – Presentation of the Current System

Ahmad Jawed Rasuli, Kabul Polytechnic University



Mr. Rasuli began his speech by pointing out that for a better administration good management is needed and that computerization of information in the administration is an issue.

In September 2008, as he went on, he started working on the HEMIS project according to the strategy of the Ministry of Higher Education. After completion of data gathering and analysis, the development of the system began. The work on this project has continued until now for four years with support of the DAAD, the World Bank, USAID and UNESCO. He remarked that it is not finished yet and there are still problems with the system.

He claimed that this system will cover all aspects that are necessary for a ministry or university, like complete information of students, like current semesters, exams, grades etc., and also information about lecturers, and more.

Since 2010, a system for registration of new students has been implemented at four Afghan universities (Kabul University, Kabul Medical University, Kabul Polytechnic University and Kabul Education University), but the universities do not yet support and implement all procedures the systems offers, and there are also still issues with the system itself.

According to Mr. Rasuli, HEMIS is designed as a web-based application consisting of the following components:

Architectural style:

component-based and layer-based

Data Access Layer (database connector)

Business Layer (summation or collection)

Presentation Layer (shows or presents data to users)

Two databases for staff and user accounts

Backup servers, redundant server

C# and ASP.NET4.0, MS SQL Server

Operating System: Windows 8

Mr. Rasuli stated that an extension of the system can be easily be worked out and that security measures are applied within different layers like https, firewalls, updated anti-virus system. Furthermore, all commands to drop tables are disabled and stored procedures are implemented to avoid SQL injection. The database is not directly accessible, it can only be accessed via different layers. The system has good performance, availability and usability and is well maintainable. Stating that authentication is role-based and encryption is implemented, he closed his speech.

Managing the Migration to FOSS in Administration Processes

Mr. Waheedullah Sulimankhail, Nangarhar University

Mr. Sulimankhail began his presentation by asking why open source is necessary for Afghanistan and what the role of organizations is to improve FOSS. He explained that Open Source (OS) products are free and that it is possible, for example, to modify the source code and to translate it to different languages. There is a license agreement for redistribution of Open Source software and generally no need to pay, it will be free forever.



According to Mr. Sulimankhail, all Afghan organizations are illegally copying proprietary software. There is no copyright law enforcement yet in Afghanistan, but it will surely come. At that point Afghanistan will face problems as it is a poor country and not able to pay for softwares licenses. Furthermore, he claimed that closed source software is less secure and that when using it, anti-virus solutions are required for example.

He went on explaining that some organizations even do buy licenses for the software they are using, but then they spend most of the money for buying them, which has an overall bad effect

on the economy.

Mr. Sulimankhail then asked how Open Source could be implemented in Afghanistan. He stated that by using Open Source, large amounts of money can be saved while the overall reliability of systems will be improved compared to those based on closed source software.

He identified the following challenges of implementing Open Source software:

- Users tend to have problems with using Open Source software.
- Additional trainings are sometimes needed.
- A good use case for Open Source in Afghanistan is localization of applications to local languages which can simplify things for users.
- There is little contribution to Open Source projects in Afghanistan.
- A plan for localization in Afghanistan is needed.

Mr. Sulimankhail listed the following ways for a migration to Open Source:

- Awareness of public and private organizations (people)
- Open Source should be taught at universities which will also push forward IT companies within the local marketplace
- Cooperation of private companies with education centers

He finished his speech by stating that the Ziik of the TU Berlin is fostering the use of Open Source software in all its projects since 2002. Since 2008, there has been an Open Source work group in Afghanistan which has been initiated by computer science Master graduates from TU Berlin.

Concept for Implementing University Portal Systems

Mr. Mohammad Rafi Bahez, Kabul University

First, **Mr. Bahez** explained that a portal is a system which can be accessed via the Internet after authentication for providing access to particular information according to users' requests.



According to Mr. Bahez, the following portals are implemented at the MoHE so far:

- AFGHAN campus medical (University of Washington DC),
- Afghanistan eCampus (Germany),
- Angel, which covers all Afghan Universities (USA)

He added that there is another portal for Kabul University which is not in use yet.

According to him, a major problem for the operation of the portal servers in Afghanistan is the poor Internet bandwidth. Downloads take very long and access is slow.

Asking what is needed is for four parallel portal systems he then made the following suggestions:

- The physical location of the portal server should be in Afghanistan, otherwise bandwidth would be wasted and traffic problems would arise.
- Servers on different locations inside and outside Afghanistan could be mirrored, which would allow for fast access and reliability.
- A "single sign on" would be required, otherwise users could become confused. This will make multiple services appear as one consistent portal system.

He concluded with the following recommendations:

- For each portal, responsibilities are to be clearly defined.
- A stable and reliable infrastructure needs to be established to allow for a high availability of the systems.
- To set up a portal is easy but to maintain it is difficult. A special focus has to lie on this aspect.
- Redundant mirror servers should be established to provide for stability and availability.

Management Systems in Higher Education

Amad Siar Mehri, Kandahar University



Mr. Mehri began his speech by explaining that information systems are used everywhere in everyone's daily work - even doing paperwork can also be considered an information system. According to him, information systems can extend and improve our work flows and allow for good effectiveness. He then asked the question what “data” actually means.

Data, as he went on to explain, is a general fact – but not yet “information”. He gave the example of a color, which would be “data”, if it were used for e.g. a birthday, it would become “information”.

Correspondingly, information systems are ways or devices which prepare procedures or process data to become information.

He then described two aspects of the HEMIS project, which is a transaction processing system to store and process data: The first one is batch processing which will produce collections of data and the second is real time processing to allow for all Afghan systems to enter data and instantly receive information that can be accessed directly via the MoHE.

He went on characterizing the process flow within the system as follows:

Information System → gathering requirements → analyzing information

He made the following suggestions for HEMIS:

- Realization of measures against power failures
- Implementation of fault tolerance systems
- The redundant servers of the system should be in different physical locations
- Open Source is to be preferred over closed source software
- Developing an economic case
- Setting up a transaction system for the provinces which should be connected with the central system

Mr. Mehri concluded that HEMIS should be built as a modular architecture, and users should be able to access specific parts. Data transfers should be restricted to certain day times as there are connectivity problems in the provinces. This will also avoid security issues.

Single Sign-On Mechanism for Management Services

Mr. Ali Aqa Naseri, Kabul Polytechnic University

Mr. Naseri started his presentation by arguing that the AfREN and SILK projects which have been described earlier will help people to reach their goals. In order to be able to do so services need to be designed for a better usability.

“Single Sign-On”, as he explained, is a service which provides centralized access to the system for all users:

- Different services can be reached via a single user name or email address. This will help to avoid having different emails (accounts) for different services.
- This technology allows for roaming networks at all participating universities.



He went on describing the concept for the implementation of this service: When all universities will be connected, it will be possible to implement this service in the context of AfREN. Fallback servers outside of the country would allow for access to the network from other locations, even abroad, with the same user name, and even if the local servers are not available. As a corresponding example, he mentioned the “eduroam” service for world-wide WLAN access which is also available at TU Berlin.

Mr. Naseri finished his speech by stating that stable infrastructures need to be available, and all universities should be connected first before such a service can be realized. As a start, it could be implemented at each university with a local scope and later on, after all universities will have been connected, the service can be extended.

A Web-Based Framework for a Unified Modular Campus Management System

Mr. Wazir Khan Ahmadzai, Kabul Educational University

Mr. Khan began his speech by presenting his ideas regarding the establishment of a modularized and unified campus management system. His major point was to emphasize the big chance for Afghanistan of being able to start from scratch with designing such a system on a national level. In order to be able to cover the individual needs of a particular university, the system would need to be built in a very modular architecture. This way, each instance can be set up with the modules enabled that are necessary to meet the individual local needs.

He divided these modules into local and globally centralized modules. The local ones would only have a limited local scope (local campus) whereas the globally centralized ones would have access to shared information and were able to operate on an inter-university scope. For those centralized



modules an adequate location/environment has to be defined for the required service topology, as Mr. Khan closed his presentation.

Discussion

After the presentation, HEMIS as a large system for higher education in Afghanistan was discussed. Core points were IT security and sustainability. Here, particularly the ideas of Mr. Ahmadzai and Mr. Bahez to create a unified system were of interest. For this project, Open Source software is to be used, because Afghanistan will not be able to cover the license costs in the near future. The participants also developed further ideas for the discussion on the third day.



Workshop: Securing IT Infrastructure

Moderated by: Ahmad Zia Sharifi, Nangarhar University

Opening by: Chi-Thanh Christopher Nguyen, TU Berlin

Introduction

Mr. Chi-Thanh Christopher Nguyen



Mr. Nguyen welcomed the participants and introduced them to one of the important topics of this workshop: the Afghanistan Research and Educational Network (AfREN). He then gave a short overview of the German National Research and Education Network (DFN): The DFN is a communications network for science and research in Germany. It operates the network that connects universities with each other and to the Internet and has established various competence centers to provide advice and support to universities. According to Mr. Nguyen, German universities traditionally have a high degree of autonomy. When it comes to internal IT structures, the universities know best (or at least they think they know best). Therefore, a large number of different campus management systems exist. Despite the diversity of these systems, as he went on to explain, the DFN manages to operate the “eduroam” service. Eduroam allows members of one university to use wireless Internet access in other universities, now part of a world-wide network. Single sign-on is a prerequisite for this service.

Mr. Nguyen mentioned that, as university's IT systems store, process and transmit important and valuable data, they must be protected against attacks. The DFN Computer Emergency Response Team (DFN-CERT) provides information and support in IT security related areas, alerts about software vulnerabilities, network scans, security incidents and organizes trainings and workshops on IT security.

Results of the Dubai AfREN Workshop

Mr. Maihan Yaqubi, Kabul University



Mr. Yaqubi began his speech by stating that from 13th to 14th December 2012 the second workshop on AfREN was held in Dubai, United Arab Emirates. He stated that since the previous workshop on AfREN took place, 85% of the planned actions have been accomplished. The list of equipment required for AfREN has been prepared and submitted to the Ministry of Communication and IT. APNIC has registered a block of 32,000 public IP addresses for AfREN, as he mentioned, and the test for their advertisement in the Internet has been successful. The design of monitoring, security and network management systems has been completed and is now being implemented, he stated.

Mr. Yaqubi remarked that a new list of action items has been created at the workshop. These include proposing the plans to the Ministry of Finance for funding, informing AFTEL about the required bandwidth for the AfREN PoPs and submitting a plan to have connections installed and tested by AFTEL in KU, KEU, KPU and MOHE by the end of February 2013. The project for monitoring, managing and securing AfREN has to be accomplished within five months and active by June 2013. He said that the physical location of the AfREN NOC will be at Kabul University. Security measures at PoPs should immediately be implemented for important data and traffic and a concrete plan has to be made for future requirements. By the end of February 2013, security measures between Kabul and Jalalabad have to be implemented. An exact estimation has to be made for the funds which need to be provided for AfREN.

Mr. Yaqubi concluded his speech by stating that the next AfREN workshop will take place from 6th to 7th March 2013.

AfREN Infrastructure

Mr. Tariq Meeran, Lecturer at Kabul University



At first, **Mr. Meeran** explained that AfREN is a National Research and Educational Network (NREN) for Afghanistan's academic community which was unofficially founded in 2006. He added that AfREN focuses on supporting universities, higher education institutions, teaching hospitals, libraries and research centers at national level by providing a high speed network backbone. This will allow academia to have access to the Internet, online resources, digital libraries, international research communities, e-communication, distance learning, e-learning, tele/video conferencing and knowledge sharing. AfREN will also represent all higher educational institutions to donor agencies, ISPs and other

organizations. According to Mr. Meeran, AfREN will also include a Computer Emergency Response Team (AfREN-CERT) to allow for coordinated responses to security threats. As a result, all these services, this provisioning and support lead to a sustainable infrastructure for facilitating quality research and development efforts. He claimed that in order to achieve this goal, a very strong network infrastructure with a long-term technical and financial support is required. AfREN's goal is to plan, implement, operate, maintain and support such an infrastructure. From the perspective of an NREN, most of the major educational institutions are currently connected via fiber-optic or satellite links to the Internet in an unorganized manner. The NRENs should be built in such a way that the educational institutions are connected with national high speed dedicated point to point links to each other and then from one central point to the Internet or international links, as he concluded.

A Concept for a Sustainable Implementation of the AfREN Project in Afghanistan

Mr. Mussadiq Jalalzai, Lecturer at Kabul University



Mr. Jalalzai began his presentation with some statements about AfREN: The Afghanistan National Research and Educational Network project (AfREN) is currently under development and funded by the NATO. He mentioned that, as most of the projects in Afghanistan are funded by foreign countries and organizations, the sustainability of this project is one of the most important factors to be considered. If a project has high implementation and maintaining costs, it will not be easy for the Afghan Ministry of Higher Education to provide budget for it.

In order to address this issue, he would suggest a concept for a sustainable AfREN implementation. The main idea behind this concept would be the usage of Open Source technology instead of commercial software where applicable, since Open Source technology is cost effective and flexible. He went on suggesting the implementation of thin client technology that helps in lowering the costs and would be a further step towards green technology. He finished his speech by explaining that he compared the costs for commercial closed source with those caused by Open Source solutions and showed an estimation of the USD amounts that could be saved if Open Source technology were implemented for the mentioned services.

A Glance to Sustainable Power Solutions

Mr. Abdul Rahman Vakili, Head of IT at Herat University



Mr. Vakili started his speech by stating that Afghan universities are currently depending on unreliable municipal power grids for operating their IT infrastructure. He claimed that equipment for backup power needs to be sized and planned to handle worst case scenarios, requiring considerable investment in electricity generators, fuel and associated power infrastructure. He went on proposing a method to limit the sustained power usage in case of power grid failure, lowering the requirements for equipment and reducing purchase and maintenance cost. This method includes virtualization technologies and migration of services between physical servers. Concludingly, Mr. Vakili stated that this method can also be adapted to situations of

fluctuating power input, e.g. solar panels.

Wireless Mesh Networks Infrastructure Approaches

Mr. Niaz Mohammad Ramaki, Kabul University



Mr. Ramaki began his presentation with the statement that (mobile) communication devices are getting smaller in size and higher in performance every day. Furthermore, they are in wider use by people who want to connect themselves with good mobile support and highly available networks. He explained that a wireless mesh network is a self-configured, self-healed, and self-organized network of mobile and fixed devices. In such a network, there are numbers of nodes (mesh routers and mesh clients) and back-haul (usually wireless) as well as access links. Wireless mesh networks can be built using established wireless technologies (i.e. IEEE 802.11, IEEE, 802.16, IEEE 802.15) for different purposes. Mr. Ramaki gave the example of an ISP

that could use mesh networks for the MAN (Metropolitan Area Network) where it wants to provide Internet services and avoid the need to install DSL cabling. Likewise, wireless mesh networks would be applicable in different situations such as temporary events (e.g. video conferences), in historical buildings where no cabling is permitted or where wiring is impossible (e.g. airports). He stressed that wireless mesh networks sometimes function as complements for wired networks, for example if the plan is to extend a wired network but due to lack of budget, a wireless mesh network would be a better solution.

According to Mr. Ramaki, there are several approaches in configuring a wireless mesh network depending on the numbers and types of the mesh nodes, application areas etc. The most promising approaches he will discuss in his thesis paper along with possible applications in higher education in Afghanistan.

Securing the Transition to IPv6

Mr. Ghulam Sanaie Ghaznawi, Kabul University



Mr. Ghaznawi began his speech by stating that when the specification of the Internet Protocol (IP) was first published in 1981, the Internet consisted of only a few nodes that were mutually trusted. Therefore, many security issues were not considered in IPv4, besides the fact that the IPv4 address space was considered vast enough. As the Internet has been growing rapidly since its commercialization, the number of Internet users has exploded and the IPv4 address range started to be depleted. Some of the regional Internet registries (RIRs) address pools are already exhausted and after 2013, none of them will distribute IPv4 addresses anymore.

Mr. Ghaznawi drew the conclusion that the only solution is to migrate the current IPv4 based networks to IPv6, for which a big international campaign has been started on 6th of June 2011 with the so called “World IPv6 day” and one year later with the “World IPv6 launch day”. According to Mr. Ghaznawi, campaigns of this kind also need government support. For this reason, the Afghan Ministry of Communication and Information Technology has instructed all ISPs in the country to start the IPv6 migration process at the end of December 2012. Due to different reasons they failed and the migration date was postponed to the end of January 2013. He mentioned that the Afghan Research and Education Network (AfREN) as an ISP for academic institutions also needs to start this migration process as soon as possible, although questions still remain of how to start, which transition mechanism to use, and which security aspects to consider in order to successfully deploy IPv6 in the future. In his thesis paper, Mr. Ghaznawi will discuss these questions and make a proposal for actions going forward in the IPv6 transition, as he concluded.

Information Security in Higher Education in Afghanistan

Mr. Khwaja Zubair Sediqi, Polytechnic University Kabul



Mr. Sediqi began his presentation by explaining that the Ministry of Higher Education (MoHE) has planned and is already working on building up stable IT infrastructures and cultivating IT education at all universities of Afghanistan. The Higher Education Management Information System (HEMIS) is a good example for an IT system that stores information in digital format. He stressed that information is an asset which, like other important business assets, has value to an organization and consequently needs to be suitably protected.

Considering the phrase 'technology is part of information security', as he mentioned, it becomes more important to understand the importance of information security at the MoHE. Mr. Sediqi said that the purpose of his presentation is to provide awareness about IT security and to explain the importance of information security for the MoHE and maybe any other organization. In his master thesis, he wants to explore security threats, system vulnerabilities, attacks, and he also aims to introduce information security principles, detection and prevention of security flaws, information security policies and other concerns regarding IT security. According to him, the aim of his work is to provide a clear view about IT security and help the MoHE to consider these IT security factors in IT infrastructure plans, designs and their implementations.

He added that security is not only IT security but also has to cover the people, processes and technologies. Referring to his thesis, he stated that current threats and vulnerabilities will be explained and examples of security breaches and possible solutions will be introduced.

Discussion



The workshop was moderated by Mr. Sharifi, Dean of the Faculty of Computer Science at Nangarhar University. The discussed topics included the Afghanistan Research and Educational Network (AfREN) project, building up infrastructure by using Open Source technologies, wireless mesh networks, IPv6 and security at Afghan universities as well as sustainable power concepts. At the end of the workshop, the participants discussed about these topics.

Eventually, Mr. Vakili was chosen to present the results of the workshop on the third day of the conference.

Day 3: December 20th, 2012

Presentation of the Workshop Results

Results of the Workshop IT Education: Challenges and Perspectives

Mr. Abdul Rahman Sherzad, Herat University



Mr. Sherzad began to give a short summary of the presentations from the previous day. After this, he explained that the workshop contributions showed the current situation and demand. He talked about the ideas and the suggestions that had been made to improve the situation and meet the demands. In the following, he presented the two focus topics of distance education and education in schools.

Distance Education

Mr. Sherzad pointed out that the eventual use of distance learning methods in Afghanistan should be carefully fitted to the demands and the current situation of the country. To achieve this, the social, technical and administrative framework of such methods has to be taken into consideration: Developing the social framework needs to take into account the specific demands of the Afghan society. The consensus of the workshop participants was that distance learning solutions should amend traditional face-to-face learning and not replace it. It could be used to reach groups that are currently excluded from higher education, e.g. people with physical disabilities, people in remote rural areas, students who need to work to support themselves and women who cannot attend lectures for traditional reasons. The acceptance of such solutions by both the teachers and the prospective students should be evaluated beforehand. The technical framework has to be fitted to the available resources and existing infrastructure. As the personal and technical infrastructure in higher education is already stretched thin, new initiatives in distance education must not be detrimental to face-to-face teaching. The feasibility of any technical solution should be evaluated in the face of the unreliable power supply and lack of basic IT knowledge especially in rural areas. Finally, to implement effective distance education solutions, it has to be made sure that an actual degree can be achieved by these means. This depends on quality control and a regulatory framework that sets clear criteria.

IT Education in Schools

Mr. Sherzad continued with the topic of IT education in schools, pointing out that the main goals in this regard lie in improving IT literacy within the Afghan society at large as well as improving the skills of students entering the universities. He pointed out that the current situation suffers from a lack of feedback mechanisms and quality control. Furthermore, there is no coordination and cooperation between the demands of higher education and IT education in schools and a severe lack of teachers that are qualified to teach IT. The conclusion of the discussion in the

workshop was that capacity building in the form of teacher training must be central to any improvement in this area and that this must be part of a coordinated effort between the different stakeholders in Afghanistan's education system. It was also suggested that an advisory panel mediates between representatives of the relevant ministries and other stakeholders to jointly determine the measures taken to improve IT education in schools.

Conclusions

The focus topics are only two aspects of the complex challenges the Afghan higher education system is facing. Mr. Sherzad continued to outline how they could fit into a unified strategy, emphasizing that new measures should only be implemented as part of the existing strategy. The focal points of this strategy are to

- continue to evaluate the needs of the Afghan society in general and the labor market in particular and adapt a unified curriculum to educate students that meet these needs.
- improve the quality and quantity of university teachers by coordinating international scholarships for master and PhD programs for university lecturers.
- develop a long-term plan for post-graduate education in Afghanistan, eventually implementing a master program in Afghanistan.
- prevent isolated solutions by improving coordination and feedback across higher education and by integrating different initiatives into a common strategy plan.

Results of the Workshop: IT in Administrative Processes

Mr. Ahmad Jawed Rasuli, Kabul Polytechnic University



Mr. Rasuli presented the results of the workshop and introduced the participants to the overall goals of the workshop in which about 45 persons participated. In the beginning, a few presentations took place, and in the following, the question was discussed of how to gather and coordinate all efforts to jointly build and establish a complete and unified management system for administrative processes in the context of higher education on a long-term basis.

Answers to these questions were given which led to the formulation of a seven point action plan for the

next few years:

Action Plan - Blueprint:

Do the activities carried out so far cover the needs?

- Create a work group for security aspects
- Create a work group for usability aspects
- Missing sub-modules (provide proposals to the IT Board of the MoHE)

Which needs can be met by IT based services and which not?

- Develop policies and legal regulations

Which infrastructural prerequisites have to be fulfilled in advance?

- Make the most out of the resources which are available now
- Infrastructure will be enhanced step by step

How to integrate new ideas into already existing solutions?

- Perform analyses of the present systems, provide clear proposals, implement them conjointly

How to avoid redundancy / clearly define service responsibilities / guarantee demand oriented services?

- The IT Board of the MoHE has to confirm every new proposal / service
- The IT Board of the MoHE chooses the “best” solution targeting the unification
- No foreign dictation

How to provide a comfortable and secure way of authentication?

- Outsource research to a master thesis on distributed authentication mechanisms

Which information has to / can be shared with whom and how?

- Systems have to adopt all conventional rules and regulations to create a broad acceptance. An analysis of the situation is required first.
- Certain manual steps have to be considered to be kept manual.

The participants agreed that if this plan will be taken as a blueprint for the next year, the given question can turn into the statement: “We gather and coordinate all efforts to jointly reach all these goals, to build and to establish a complete and unified management system on a long-term basis!” For Afghanistan, the current situation can be understood as a big chance as we are able to start from scratch with a unified system on a national level. This chance has to be taken, all efforts have to be gathered and coordinated well to define, conceive and implement such a unified system.

Results of the Workshop: Securing IT Infrastructure

Mr. Abdul Rahman Vakili, Herat University



Mr. Vakili introduced the results from the IT infrastructure workshop with about 45 participants. Within this discussion, participants presented their results which have been discussed controversially afterwards and proposed solutions.

A number of problems were identified regarding the AfREN Board which oversees the AfREN development and planning. These include a communication problem, specifically the lack of documentation and non-existing reports. The membership structure of the board is unclear, as some persons who were listed as members were unaware of the fact that they were actually members.

As a solution and proposed action, the AfREN board members should be reconsidered and inactive members removed. The AfREN board will provide documentation and reports. It is the responsibility of the IT Board of the MoHE to supervise this.

Power supply

For the problem of unreliable grid power, there is currently no sustainable solution implemented. The proposed action is to do further research to find solutions and resources for a sustainable and stable power supply.

AfgREN Software

The planning of the AfgREN infrastructure currently includes a number of systems which will run on proprietary platforms. In the interest of cost saving and sustainability, Open Source solutions should be preferred where suitable. However, it is unclear yet whether Open Source routing solutions can replace costly proprietary Cisco routers.

A policy should be issued to use Open Source as much as possible. Research should be done on the issue of suitability for routing by performing extensive testing of Open Source products

Wireless Mesh Networks

In the current phase of the AfgREN project, it is not planned to connect schools to the network, although a provision exists that makes this an option at a later date. It is however clear that connecting schools the same way as connecting universities will be expensive. If wireless mesh networks could be used in the future to connect schools to the AfREN, this could lead to significant cost savings. But it is unclear yet whether this approach is feasible at all.

Research must be done and wireless mesh networks must be deployed in a testing scenario to determine whether they are suitable for connecting schools to an AfREN uplink.

Currently, the AfREN NOC has only one Internet uplink, which is a single point of failure. Therefore, a second uplink needs to be installed.

AfgREN NOC

The AfgREN NOC itself is also a single point of failure. In case the NOC ceases to operate due to fire or other disasters, there is no backup operation center which can take over. This would lead to the disruption of AfgREN services.

For the NOC, there is no immediate solution. A backup NOC cannot be implemented in the current phase, because the agreements with the donors include only a single NOC for now. It needs to be proved first that the single NOC works, and then a concept is needed for a distributed NOC.

Final Discussion about the Resulting Measures and Their Implementation

The discussion was moderated by Prof. Baray Sediqi, Deputy Minister of the MoHE, Dr. Nazir Peroz, Head of ZiiK at TU Berlin, Mr. Salim Saay, Head of IT Department of the MoHE, Prof. Hassan Adelyar, Kabul University, Mr. Ahmad Jawed Rasuli, Kabul Polytechnic University, Mr. Abdul Rahman Sherzad, Herat University and Mr. Akmal Yaqini, IT Board of the MoHE. After the presentations of the workshops, all participants of the conference had the opportunity to ask questions about the workshop topics. For each workshop, the time frame for questions and answers was 20 minutes.



At first, the results of the **IT education: challenges and perspective workshop** have been discussed. The participants thanked for the presentation of the results and asked their questions. The first question was how to establish a common education concept which integrates school and academic education and which role the universities have in this concept. The participants stated that it is important to educate qualified teachers in the area of IT. The universities expressed their wish to create computer science faculties to cover these needs. Then the participants discussed the question whether Afghanistan should have a unified IT curriculum. Some argued that if this were the case, the universities would be bound to a certain set of study courses and subjects. This was denied, as first of all, basic knowledge and expertise needed to be taught in this area.

An important topic of the discussion was distance learning. Many participants first asked for an explanation of this term. The IT Board of the MoHE is to deal with this question and to respectively inform the universities. It is clear that face to face education should never be replaced in Afghanistan. Especially Afghanistan with its history of more than 20 years of war needs this kind of traditional education. Even most western industrialized countries, although they could implement distance learning, focus more on face to face education.

After this, the results of the **IT in administrative processes workshop** were discussed. The main aspect, to which all participants agreed, was that the universities need to improve their administrative structures. Now it is the question now, which technology and platform to choose, how to integrate them and how to sensitize the employees to the use and the needs of such technologies. For a sustainable and secure implementation it was suggested to involve the current computer science master students in this process and to focus on Open Source solutions. The IT Board of the MoHE is to draft a plan how to structure this process.

There have been many discussions about the results of the **Securing IT Infrastructure workshop**. First of all, the participants criticized the name “AfREN” as it matches the name of a similar project for Africa. It was suggested to use a small “f” in the project name. Many participants suggested defining AfREN’s goals and activities for the universities. One of the participants proposed to develop a life cycle of the project with the following steps:

- Analysis of problems
- Structural requirements specification
- Management
- Planning
- Maintaining

This life cycle has to be supervised by a work group. He suggested that the IT Board is to establish such a work group in order to avoid problems and increase transparency in this matter.

Some participants argued that the term “IT” should generally be more explained within society.

All in all, Open Source solutions have been favored by the audience. These technologies should be selected soon for a most sustainable and future-proof structure. Many participants suggested, though, that it should not be acted too quickly. The decisions should rather be based on an analysis of the current IT situation and the respective requirements.

In the end, Dr. Peroz thanked the MoHE and the participants for their support as well as the Federal Foreign Office and the DAAD for their funding and support of the conference. He also expressed his thanks to the employees of the TU Berlin for the organization of the conference and the workshops. Prof. Sediqi also thanked the participants and the TU Berlin for the good cooperation. Finally, he issued certificates to some of the participants of the conference on behalf of the MoHE.

December 17th – 19th, 2013

IT Conference Part IX in Kabul

Conference topic: Innovation and Education in Computer Science for Afghanistan

Day 1 and 2, December 17th – 18th, 2013

Welcome and Opening

Prof. Osman Babury

Acting Minister of the MoHE and Deputy Minister of Higher Education

Dr. Nazir Peroz, Head of ZiK at TU Berlin

During the three-day conference, the Afghan Computer science Master's graduates from TU Berlin presented their research and IT projects on the first and second days of the 13th IT Conference. On the third day there was a workshop on IT training with a focus on curriculum development. At the end of the conference the invited guests, experts, Afghan IT lecturers and Afghan master's graduates from TU Berlin exchanged their specialist knowledge. A detailed documentation from the third day is not available only the program.

Presentation of Afghan Computer science Master project`s from the TU Berlin

Concept for the Improvement of Information and Communication Technology (ICT) Usage for Education at Kandahar University

Sayed Ahmad Mahboobi, Qandahar University



Concept for the Improvement of ICT's Usage for Education at Kandahar University Innovation and a rapid development of technologies have influenced each aspect of human life. In the world today, Information and Communication Technologies (ICTs) are counted necessary require-ments in changing and modernizing working con-ditions, solving problems and improving perfor-mances. Particularly, in the educationsystem ICTs have an impact on the improvement of teaching and learning methods, facilitating approaches for learning anytime and anywhere, and providing opportunities to have access to a wide range of world-wide information resources.

Looking at the relevance of ICTs in education, a survey has been conducted within the scope of this thesis to understand the status, usage, and awareness of modern technologies at Kandahar University. The main components of the survey were to evaluate IT infrastructures, Internet facilities, library resources, awareness of e-resources and the main challenges and opportunities in the field of ICT. In addition, the survey involved questionnaires for lecturers and students to acquire a general understanding of the computer education level, the usage of information resources and the library for learning purposes. Based on the survey findings, Mr. Mahboobi's thesis proposes a concept for the development of ICT and for the improvement of its usage in the education system at Kandahar University and throughout Afghanistan. These improvements will help facilitate modern technologies, enhance the level of education and enable learners to use

information resources and technology in their learning activities in a better way. The proposed concept introduces three initiatives that have to be implemented: Developing an information literacy training program, establishing an IT center and creating an ICT committee. These innovations will provide a good starting point toward the development of ICT and its usage in the education system in Afghanistan.

Analysis of the IT Situation at the Universities of Balkh Province in Afghanistan

Walida Fayez Sardari, Balkh University



The availability of universities and opportunities for higher education play an important role in the development and progress of information technology, knowledge, and research in developing countries like Afghanistan, especially in Balkh Province.

The objective of this thesis is to find out and analyze the status of the IT situation at three public and private universities (Balkh, Aria and Sadat) of Balkh Province in Afghanistan through two aspects: IT infrastructure availability and accessibility and IT education, human resources availability and their capacity. A structured qualitative observational research method (interviews, questionnaire, discussions, field notes, review of the relevant documents, reports, and policies) has been chosen to collect data for the analysis of the IT situation

at the three selected universities (Balkh, Aria, and Sadat).

Beside the major findings, this research showed that there is a lack of IT centers and computer labs, little availability of functional IT equipment and a large number of non-functional IT equipment, a serious lack of IT professionals and of licensed software, and the non-existence of a general IT policy or protocol for the universities to define criteria for the creation of a computer science faculty. It also revealed that the government and donor support plays a very important role in the availability of IT infrastructure, equipment and resources.

As a conclusion it can be said that applying the concept which has been introduced in this research is to improve the current status of IT at the universities of Balkh Province in Afghanistan. Government, donor will, support and close coordination are needed to develop and implement projects in order to improve the current status of IT at the universities of Afghanistan.

Concept for the Development of Quality Assurance and Accreditation Processes for Higher Education in Afghanistan

Huma Yari, Kabul University



Quality of higher education and the need for effective quality assurance mechanisms beyond the institutions are becoming prioritized topics in national strategies for higher education. Afghanistan has passed more than two decades of war and now it is in the time to reconstruct everything from scratch. Literacy and higher levels of knowledge and expertise can help Afghanistan reach its goals.

The quality of knowledge of graduated students is related to the quality of their institution. Therefore, rebuilding, promotion and quality improvement of the higher education institutions of Afghanistan has a major impact on many aspects of the development of the country. In her thesis, Ms. Yari analyzes quality assurance processes in Afghan higher education and develops a concept to

improve these processes in order to enhance accountability and quality improvement and to gain sufficient outcomes.

Since almost two years, quality assurance and accreditation is a special focus of the Ministry of Higher Education in Afghanistan. To develop successful processes, the cooperation of all stakeholders, who are participating in it, and good mechanisms are required. On the one hand, it is thus very important to first examine the situation which is required for applying the process, and on the other hand, the motivation of the participants is also crucial.

Involving modern technology can support the development of the process. Therefore, a concept of a web application is suggested to enable the participants of quality assurance processes to use information technology facilities. This will provide transparency, accuracy and other benefits for the development of quality assurance processes.

Concept for a Unified Educational Portal System and its Reliable Underlying Topology in the Context of Regions with Weak IT Infrastructure

Mohammad Rafi Bahez, Kabul University



Providing services remotely is a common approach for regions with relatively poor IT infrastructure (e.g. Afghanistan). A problem with such a system is that the availability and contents retrieval time depend on the availability and speed of the Internet connection. Providing web-based services from inside the country faces the same problem. Accessing a server in the same country leads to route traffic via neighbor countries and then back to the respective server.

In his thesis Mr. Bahez presents a module which dynamically configures the BINDv9.x DNS server in a way that it provides the closest server's IP address respective to the user's location. The redirector can operate by using three policies. Each policy uses different criteria to redirect a user to the closest server.

Concept for a Student Information Management System Supported by Nearfield Communication Technology for Afghan Universities

Ghezal Ahmad Zia, Kabul University



In his thesis Mr. Zia describes a concept to overcome current problems of the educational system and to provide improved facilities for the future of student self-administration. In his thesis he focuses on a Student Information Management System (SIMS) for Afghan universities, based on a concept of Free Open Source Software (FOSS) and using the application of Near Field Communication (NFC).

One of the current and discussed problems is the 'student attendance system'. The conventional system of taking attendance by calling student names in a class of 250 students is time-consuming and insecure. Therefore, a computer and NFC based attendance management system will assist universities and lecturers in this process. The resulting concept of his paper can be handled as a reference for schools in

Afghanistan.

Dealing with Design-Actuality Gaps in the Development of Information Systems for Developing Countries: The Example of a Hostel Management System for Herat University

Foawziah Naseri, Herat University



Ms. Naseri motivated her talk by illustrating the common problem of implementing information systems in developing countries. She cited scholars whose research showed clearly that the gaps between the planned system and the actual implementation are huge and account for a large amount of failures. Estimates say that more than half of those systems fail either completely or partially.

After outlining the theoretical framework in which these differences between idea and execution can be looked upon, she introduced her own project: She planned and implemented a hostel management system for Herat University that was developed by directly integrating feedback and opinions of the administrative personnel currently running the dormitories. She showed the results

of both her empirical research and her implementation efforts to illustrate how a demand-oriented IS development can look like.

Building Network Infrastructures at Shaik Zayed University, Khost, with Wireless Mesh Networks

Saminullah Sameem, Khost University



Mr. Sameem introduced the audience to the campus network at Shaikh Zayed University (SZU), which is located in the far south-east province of Khost, Afghanistan. The university has a large campus, built with support from the United Arab Emirates. As other institutions throughout the country, SZU is also facing internal network infrastructure and power supply problems.

The current infrastructure of the network is limited to twisted-pair ethernet cables. In this thesis, the option to augment and extend the infrastructure by employing wireless mesh networks which are run by a sustainable power source such as solar power is analyzed. Mobile

and stationary users will be able to connect and access the Internet everywhere on campus rather than only at fixed points. This way, a wide area can be covered with low cost, configurable, manageable, free and open firmware based routers.

Concept for a Plagiarism Detection System for a Research Exchange Platform at the Academy of Science, Afghanistan

Hamidullah Khanzai, Nangarhar University



In his thesis Mr. Khan Zai provides a concept for the implementation of a plagiarism detection system adapted to be able to detect plagiarized parts in papers written in Afghanistan's national languages Pashto and Dari. The thesis also discusses different types of algorithms for plagiarism detection and challenges between right-to-left and left-to-right languages, especially when fingerprint algorithms are used.

Developing and Deploying a Modular Learning Management System for Afghan Universities

Ahmad Nawid Mustafazada, Kabul Polytechnic University



Mr. Mustafazada presented the current state of learning management systems in Afghanistan. After discussing the main features and their relevance for teaching and administration at Afghan Universities, he discussed the different Open Source implementations currently available. Concluding that Moodle fulfils most of the requirements of Afghan universities, he introduced his ideas for an automatic deployment solution.

Especially universities without dedicated IT staff can use the scripts and installers developed by him in order to deploy a ready-to-use learning management system. Mr. Mustafazada closed his talk by pointing out that his solution constitutes a pragmatic approach that can be used to quickly make IT systems available at universities that have some infrastructure but far too few qualified people.

Overcoming Accessibility and Localization Challenges in Software Development for Afghanistan: Hajj Pilgrimage Management System

Abdul Razzaq Hamraz, Herat University



Developing software in developing countries comes with a specific set of challenges. One of those is to adapt the developing process and the finished product to the socio-cultural context. On the one hand, this obviously means to provide the user interface in the local languages. On the other hand, in countries with low literacy rates, this has to be taken into account and the user interface should be usable by people with limited reading skills. Mr. Hamraz explores in his thesis the different challenges that occur in this context and shows how those can be overcome in the context of his own prototype implementation of a management system for the Hajj pilgrimage. He had researched the administrative processes underlying this pilgrimage in Herat and presented how they can be mapped to a web application that is usable by the target group in

Afghanistan.

A Distributed Database System as the Backbone of a Modular Campus Management System for Afghan Universities

Wazir Khan Ahmadzai, Nangarhar University



In Mr. Ahmadzai's thesis, the structure of the information management system HEMIS is comprehensively analyzed and an alternative structure and concept is proposed. HEMIS is operating since 2011 in the environment of the Ministry of Higher Education of Afghanistan. Mr. Ahmadzai suggested that due to the underlying model of a centralized system, it is largely ineffective and hardly used productively. A distributed database backbone concept is presented as a possible improvement of the current system and as a basis for a future system. This would alleviate the concern that the centralized structure of HEMIS constitutes a single point of failure and that given Afghanistan's limited Internet infrastructure the distributed nature of such a data backbone would increase availability and

robustness. He also introduced his prototype of a data backbone, noting that it constitutes a data access layer that can be used in principle by any kind of middleware or frontend system.

The Impact of Component Based Software Development Exemplified by an Inventory Management System for Herat University, Afghanistan

Somaia Zabihi, Herat University



The first objective of Ms. Zabihi's thesis is to discuss about the Component-Based Software Development (CBSD) as one of the advanced methodologies. The context is set to component-based development of an inventory management system for Herat University in Afghanistan. Meanwhile, her second objective is to find out answers to the questions whether CBSD can be a proper approach in Afghanistan, particularly in the context of the Herat University Inventory Management System (HU-IMS), and how cost and time-efficient CBSD is in all aspects.

The paper discusses the lifecycle of HU-IMS according to the V model. It only focuses on details to cover the selected phases such as requirement analysis, system design, selection, adaptation, and the test phases of system

development in the V model. The results of the thesis confirm applied CBSD considerations when designing HU-IMS which of course is a proper approach in the Afghanistan scenario.

IPv6 Transition Action Plan for Afghan Academic Institutions

Abdulaziz Akbary, Khost University

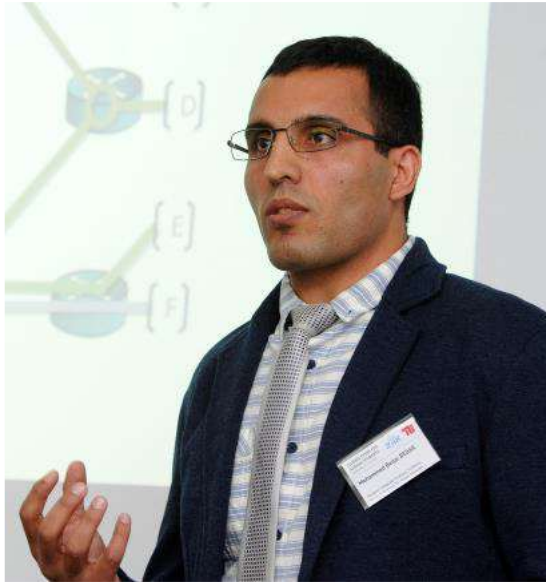


Mr. Akbary introduced his work and outlined the reason for its importance for the future of IT in higher education in Afghanistan. The expansion of the World Wide Web, the growth of Internet users, web and file hosting providers are increasing the global volume of Internet traffic and hosts. The expansion is predicted to outgrow the IPv4 address space soon. Academic institutions develop IPv6 migration strategies in order to implement IPv6 in their own respective organization. This Master's thesis is dedicated to explain the structure of IPv6 and the transition mechanisms, to develop an IPv6 transition action plan for Afghan academic institutions and to evaluate the quality, and security of IPv4

versus IPv6 networks.

Analysis of Programming Abstractions in Partial SDN Deployments and their Limitations

Bedar Mohammad, Kabul Education University



Mr. Bedar's work looks into Software Defined Networking, an emerging trend in computer networks. It brings the control and management of network into software, and allows innovation by opening the network control plane. Networks can benefit from capabilities that are realized with SDN: such as Consistent Network Updates, automated troubleshooting and more. Realizing these benefits in the enterprise network setting is a challenge, however: Enterprises cannot just throw away and replace the entire existing network infrastructure with SDN capable devices.

Following this motivation, Mr. Bedar introduced the approach he looked into: In order to realize the benefits of SDN, while still using most of the existing network devices, only a subset of devices is upgraded, employing an architecture and methodology called Panopticon. It provides a way to control and manage legacy networks and provide a logical SDN abstraction to SDN controller platforms.

However, from the SDN controller's point of view, Panopticon sacrifices network control to some extent. Mr. Bedar's thesis aims to capture the notion of how much network control we have in a partial SDN deployment and how it can be compared to the amount of control in a full deployment. It tries to answer those questions by simulating and analyzing SDN programming abstractions in incremental deployments.

Mr. Bedar continued to show the results of his simulations and the conclusions that can be drawn from them. He closed by outlining how his topic can be relevant for deploying modern network infrastructure in Afghanistan.

A Concept for a Distance Education Framework and its Deployment in Afghanistan

Ashiqullah Alizai, Heart University



This thesis explores how distance education can fit in the context of Afghanistan's educational landscape. It gives an overview of the Afghan higher education system and explores different theories about distance education. It focuses on a theoretical perspective based on the transactional distance theory by Michal Graham Moore, which fits well into Afghanistan's con-text. The main components of this theory are the dialogue between instructors and learners, the structure of the course, and the autonomy of the learners. Mr. Alizai presented the model in a practical way by putting it in the context of empirical data collected at Herat University. He concluded that the model

presented methods that encompass the whole lifecycle of the development process of a distance education framework.

He then showed his own modifications to the process, which focused on making the model more malleable in order to better adapt to the situation of developing countries, and presented strategies for deploying distance education in Afghanistan.

Side-effect Analysis of Map Reduce Optimization in the Data-center

Khwaja Zubair Sediqi, Kabul Polytechnic University



Mr. Sediqi motivated his presentation by giving an overview of the Internet's rapid growth. He stated that the growing trend of Internet applications made it necessary to serve millions of users around the globe, so the amount of generated data is huge as well. Users who interact with the Internet generate various data such as click-stream data, crawled web documents, web requests, logs and more.

Traditional database systems have difficulties to manage these large amounts of data. To solve these problems, Google invented the Map-Reduce methodology, which was inspired by older ideas from the functional programming, distributed computing, and database communities. It was originally used as a solution to build search indexes, but since then it has been used by many other industries. MapReduce is a programming paradigm used to process large datasets and Hadoop is an open source implementation of MapReduce. Hadoop runs on clusters of computers and processes the data in a distributed and parallel manner.

The focus of Mr. Sediqi's thesis is to analyze the performance of optimized Hadoop schedulers like the capacity scheduler, fairshare scheduler and speculative tasks execution. The side of collocated datanodes is also covered in his work.

He proceeded to present the results of the work he did in an experimental test bed, showing that according to his initial results the collocation of nodes has a negative impact on job completion time.

Improving IT Education at Afghan Schools

Sayed Abdullah Walizai, Kabul Education University



In his thesis Mr. Walizai does research about the current computer education at Afghan schools. He tried to analyze the current situation through interviews with teachers, students and computer science professionals, and to develop an appropriate solution based on an analysis of these findings.

Computer education at Afghan schools is facing several challenges, most notably in terms of syllabus development, teacher proficiency and IT infrastructure. As the results of Mr. Walizai's research show, the syllabus in most Afghan schools consists of rather a few Microsoft applications under Windows. The teachers themselves are non-professionals and many of them did not receive a particular training in the field of computer science.

They are also mostly unaware of the concept of Open Source. The situation of IT infrastructure is also poor. A few computer labs exist with little reliable equipment and Internet connections are rare.

As a solution, Mr. Walizai proposes a concept to improve the situation. This approach includes a syllabus renewal according to international standards which contains theoretical concepts and supports abstract thinking and creativity as well as IT security issues. A professional syllabus committee is to be set up and put in charge of this task. To improve teacher proficiency, trainings for teachers, both in-service and pre-service, are to be established. For the IT infrastructure, computer labs at schools need to be set up or extended with reliable hardware equipment, stable power supply and Internet connectivity.

As a conclusion, it can be said that computer education in schools is an important subject which needs broader attention of the policy makers in the government to be improved. It can help to enhance students' creative and abstract thinking. As computer technology is almost used in every part of our daily life, students in schools must learn this field.

Development of a Strategy for a Sustainable Migration of Proprietary Software to FOSS for Afghan Organizations

Waheedullah Suliman Khail, Nangarhar University



In his thesis Mr. Sulaiman Khail provides a deeper look into Open Source Software, its history and the philosophy behind it. Different characteristics of Open Source and proprietary software are discussed as well as advantages and impacts of migration processes from proprietary to Open Source based solutions in public organizations.

The described migration process is recommended to be deployed in three main steps which can be implemented independently. In his thesis Mr. Sulaiman Khail first identifies the client level migration, second the community building phase and as the third step the server migration process.

The thesis proposes an implementation concept for each of these three phases. Besides, Mr. Sulaiman

Khail formulates a framework to increase the availability and accessibility of Open Source software and related to important security updates in regions like Afghanistan.

Analysis of Agile Methodologies and Software Quality Implications for Countries with a Young Software Development Industry

Mahmood Asgharzada, Herat University



Even though agile methodologies have optimized software development processes and outputs, software testing still is the critical failure reason for software projects. Although agile implementation of software testing can optimize the outputs in terms of quality, iterations in software testing are much more expensive in terms of value. The optimal solution is to implement testing as sufficient as possible in each single step before moving to the next steps in order to reduce the iterations as much as possible.

In his thesis Mr. Asgharzada introduces the principle of 'good enough' as a quality level for an optimal solution. The principle requires defining value propositions of all project stakeholders and then influences and decides on the adequacy of testing in

each different level accordingly. Since stakeholders play a significant role for the principle, they, as non-technical factors, can have a huge influence on the output. Thus, further precise analysis and adaption is probably required.

The objective of his thesis is to analyze and implement the principle of 'good enough' as an agile methodology in order to optimize and achieve a maximized value of a software project – exemplified by a concrete case study at Herat, Afghanistan.

Urban Wireless Mesh Solutions for Connecting Educational Institutions

Niaz Mohammad Ramaki, Kabul University



Mr. Ramaki presented his goals of providing inexpensive access to the Internet for schools and other institutions, by leveraging existing or planned infrastructure and augmenting it with equipment at minimal additional expense.

The Afghanistan Research and Educational Network (AfgREN) acts as an Internet service provider (ISP) for educational institutions, teaching hospitals, public libraries, and research centers at national level. Universities are connected to the Internet via national fiber backbone, or via satellite. The goal of AfgREN is to plan, operate, and maintain such a national infrastructure for academic purposes. This thesis analyzes opportunities to extend this reach to non-academic educational institutions such as schools by

employing low-cost wireless mesh networks.

Application of Aspect Oriented Methodologies to the Development of a Web-based Scholarship Management System for Afghan Students

Ashraf Ali Tanin, Kabul Polytechnic University



In his thesis Mr. Tanin discusses the application of aspect oriented programming paradigms in the context of the implementation of a student scholarship management system. His main discourse is about the identification of relevant cross-cutting concerns and the implementation of the respective aspects to create a maintainable and reusable source code.

Securing the Transition to IPv6 in the Afghanistan Research and Educational Network

Ghulam Sanaie Ghaznawi, Kabul University



Mr. Ghaznawi began his talk by describing the need for Afghan ISPs to respond to the upcoming changes in the basic protocol that drives the Internet. The Internet Protocol version 6 (IPv6) is the latest revision of the Internet Protocol. Its predecessor IPv4 is the current key component of the Internet, but due to the exhaustion of the IPv4 address space, it is now considered insufficient for sustaining the future growth of the Internet. Replacing IPv4 with IPv6 is not possible within one day. It is rather expected that IPv4 and IPv6 will coexist for a long time, while ISP networks gradually move towards native IPv6. Mr. Ghaznawi's thesis sheds light on this transition with focus on security considerations.

Developing a Single Sign-on System for Higher Education in Afghanistan

Ali Aqa Naseri, Kabul Polytechnic University



Mr. Naseri motivated his talk by pointing out the increased mobility in IT applications today.

Within modern IT, with users moving beyond a single administrative domain, accessing local resources not only from the inside but also from the outside of an organization, has become critical.

Running businesses or providing education services in a federated fashion is contemporary today. The focus of this thesis is the technical analysis for proposing a single sign-on solution to governmental universities in Afghanistan.

Extending the Operating System Support of the Karma VMM

Ahmad Siar Mehri, Qandahar University



Mr. Mehri began by introducing the concept of virtualization and outlining its advantages and prospects. He pointed out that it extended the security of systems and improved recoverability. This was followed by a short overview of the technology stack that is at the center of his thesis: The Karma virtual machine monitor that builds on a micro-kernel architecture and thus allows to run different simulated machines on one physical machine. He continued by pointing out the contributions of his thesis in which he implements a solution for wider operating support for the Karma VMM. He concluded with an assessment how this technology can be used to increase the security of server systems in Afghanistan.

Day 3, December 19th, 2013

Workshop IT curriculum

Guideline for the development of a curriculum

Dr. Nazir Peroz, TU Berlin

Description of terms: Information Technology, Computer Science, Curriculum, Syllabus, etc.

Eva Hoffmann, TU Berlin

Presentation of the syllabus in computer science at the Kabul University

Prof. Homayon Naseri, Dean of the Faculty Computer Science at Kabul University

Presentation of the syllabus in computer science at the Kabul Polytechnic University

Prof. Mirza Mohammad, Dean of the Faculty Computer Science at Kabul Polytechnic University

Presentation of the syllabus in computer science at the Herat University

Hamid Mohmand, Dean of the Faculty Computer Science at Herat University

Presentation of the syllabus in computer science at the Balkh University

Engineer Mohammad Sharif, Dean of the Faculty Computer Science at Balkh University

Presentation of the syllabus in computer science at the Nangarhar University

Zia Sharifi, Dean of the Faculty Computer Science at Nangarhar University

Presentation of the syllabus in computer science at the TU Berlin

Chi-Thanh Christopher Nguyen, TU Berlin

Summary and conclusion

Moderation: Prof. Osman Babury, Deputy Minister of the MoHE,
Dr. Nazir Peroz, Head of ZiiK at TU Berlin and Salim Saay, Head of IT Department
of the MoHE

December 16th – 18th of, 2014

IT Conference Part X in Kabul

Conference topic: Development of IT Structures at the Afghan Universities

Day 1, December 16, 2014

Welcome and Opening

Prof. Osman Babury

Acting Minister of the MoHE and Deputy Minister of Higher Education



welcomed all guests on behalf of the MoHE, especially the Deputy Minister of Communication, Mr. Ajmal Marjan, the former Minister of Higher Education, Dr. Sharif Fayez, the Deputy Ministers of the MoHE, Prof. Walizai, Prof. Sedigi and Prof. Husseinnian, the Presidents and lecturers of the Afghan Universities, representatives of the World Bank and Dr. Nazir Peroz and his team from TU Berlin. In his speech, he covered four main aspects: the current status of the IT supply at the Afghan

universities, the importance of IT and computer science in the Afghan higher education sector, the main goals of the IT Strategy Plan and the challenges with its implementation.

Prof. Babury began his talk by explaining that, since 2002, many things had been achieved in the area of IT infrastructure, IT education and IT management. Examples were the strengthening of IT infrastructure like the Afghan Research and Education Network (AfgREN) and the establishment of IT Centers at the Afghan universities, five of which most modern and set up with support from TU Berlin.

In the area of IT education, many faculties of computer science had been established and access to computer science education at public and private universities had been significantly extended. In the area of IT management, the "Higher Education Management Information System" (HEMIS) was a milestone for the modernization of the administration. Furthermore, an IT Board had been established at the MoHE and good achievements in the area of Human Resources had been made. IT and computer science today, Prof. Babury continued, were credible tools for increasing the competition between universities and academics to enhance the quality of research and education. They also played a key role in decreasing the costs of the universities. The impact of globalization, Afghanistan's changing place in international relations, the expansion of business and commerce, the increasing mobility in the work place, and the information technology revolution had placed increased demands on higher education. In the last few years, these had become even more critical. IT applications at the universities were one of the criteria of credibility within the quality assurance approach.

Prof. Babury said that IT had emerged as a crucial indicator in the higher education system while there was a global trend to transform the student's role from "consumer" into "creator".

Prof. Babury presented the main goals of the IT Strategy Plan of the MoHE which were to further develop and extend AfgREN and HEMIS, to establish appropriate human resource capacities, to increase access to qualitative computer science higher education (Master and PhD) and to develop required IT infrastructures like IT Centers and campus networks. After these three points, Prof. Babury stressed the main challenges to reach these goals, which are governance, increasing the quality of computer science higher education, implementing security measures and increasing the integrity of the system in the higher education system of the country.

In the end, Prof. Babury expressed his thanks to the German Government, the DAAD and especially TU Berlin and Dr. Peroz for the organization and support of the conference series. He also thanked further parties like NATO and other stakeholders of IT in higher education of Afghanistan.



During the conference opening session, **Deputy Minister Mr. Aimal Marjan** from the Ministry of Communications and IT congratulated the Ministry of Higher Education and the team behind the ICT conference for successfully convening these annual conferences.

Mr. Marjan told the participants that ICT nowadays was an imperative need of life which could not be avoided anymore and which had to be adopted by the Afghan government and society. He mentioned that one could be proud of the fact that Afghanistan was almost at par with the

other countries in the region, regarding the adoption and use of new communication technologies.

Mr. Marjan congratulated the Ministry of Higher Education for its achievements in the area of ICT in higher education institutions and stressed that students and faculty members should use the new facilities for research, as the culture of research was very weak in both public and private universities.

Mr. Marjan once again confirmed the partnership between both ministries in the area of ICT in education. He told the participants and the MoHE leadership that, as per the commitments of MCIT, 9 new universities were now connected to the national fiber grid and that they could be inaugurated right after the conference. He mentioned that MCIT was ready to install specialized ICT labs at these universities in order to boost the pedagogy methods. "MCIT is committed to help our young entrepreneurs to establish their own businesses". With these words Mr. Marjan let the participants know that MCIT had launched an ICT incubation center called "Ibtikar", where young talents were offered mentorships to help them establish their own ICT companies and be active members of the Afghan ICT private sector.

Mr. Marjan also mentioned that MCIT was committed to help implement the innovative ideas by introducing a program called "DEWAE". Here, young ICT talents could receive money prizes in the amount of USD 2,500, USD 5,000 and USD 80,000 for their innovative ideas, solutions and full implementations respectively. He said that the program would boost the culture of innovation and unleash the ICT potential of young students and entrepreneurs.

Mr. Marjan concluded by emphasizing that one could be lucky to have a savvy ICT leadership, which would promote the adoption and development of the ICT sector in the country by accepting it as a new economic sector besides mines, agriculture and trade.



Dr. Nazir Peroz, Head of the ZiiK of TU Berlin, welcomed all guests. Before starting his talk about “Afghanistan Digital 2025”, he handed over the documentation “IT Structures for High-er Education in Afghanistan – Project Overview 2001-2014” from the ZiiK of TU Berlin to Prof. Babury and to Mr. Sofizada, representative from World Bank.

Dr. Peroz began his talk by stating that information and communication technologies (IT) played a decisive role for the future of Afghanistan as a high-tech location. He said

that IT was the key to productivity in all fields. IT was the leading sector in Afghanistan, as measured against its gross value added. Thus, there was a strong need for the creation of jobs. According to recent estimates, Dr. Peroz continued, Afghan public services, au-thorities, universities, schools, administrations, enterprises and private companies were in need of approximately 500,000 employees until 2025.

He explained that a rapid development had been taking place in the country already. Institutions and private corporations had invested in Afghanistan and had established a num-ber of IT services like eGovernment, eCommerce etc. Both public and private education facilities had been created. The TU Berlin alone had educated over 7,000 people (more than 200 IT administrators, 48 computer science Master's graduates with 25 more cur-rently studying at TU Berlin and 4 PhD students currently registered at TU Berlin in the area of computer science). Furthermore, five IT centers had been created at the Universi-ties of Kabul, Herat, Balkh, Nangarhar and Qandahar.

However, all started projects in Afghanistan needed a better coordination, which was cru-cial for the security and quality. Therefore, Dr. Peroz went on, a compre-hensive IT strate-gy was of central importance for the digital future of Afghanistan. It should become the roof for the IT policy of the Afghan government, economy, science and society, and be regarded as the basis for designing an IT location in Afghanistan. The project „Afghanistan Digital 2025“ should help to achieve this goal. According to Dr. Peroz, the following prerequisites are needed for the further planning, development and implementation of the IT strategy:

- IT structures such as a stable energy supply system and Internet access
- effective IT services
- media competence and IT soft skills
- qualified IT specialists
- modern administrative structures
- sound management
- IT laws

Unfortunately, Dr. Peroz continued, Afghanistan had large deficits in these fields which was mainly due to the wars and civil wars that had lasted for more than two decades. They had had a huge impact on the weakening of the whole education system and infra-structure. Another reason was the lack of planning. Thorough planning would set the milestones for the development and progress of this new modern technology in Afghanistan.

Dr. Peroz told the audience that, with a share of 60 percent of the population under the age of 35, Afghanistan was a very young society. Thus, the IT strategy would also make use of this potential for a sustainable development and economic growth. During the development and implementation of the strategy, international activities, especially in Asia, should be taken into consideration in order to help the IT location Afghanistan assert itself in the surrounding area. Those who would count on Afghanistan as IT location and en-force it, would gain competitive advantages for the future.

He said that the project „Afghanistan Digital 2025“ aimed to:

- analyze the demand of the Afghan society, economy and science
- consider the cultural and traditional value system of the Afghan society
- expand digital infrastructure in order to fulfil the future requirements in a sustainable manner
- boost the competitiveness through the use of IT at all stages of the economic process
- develop and expand new labor markets in the IT sector
- cover the demand for IT professionals by offering more training and further training programs
- extend and strengthen good education programs for new IT branches at vocational training schools and universities
- use IT consistently in order to solve societal challenges, e.g. security, sustainability and climate protection, health, mobility, administration, and enhance the citizens' standard of living
- modernize the traditional branches, e.g. administration, through the use of IT
- promote talented young people through targeted programs (e.g. scholarships)
- expand research in the IT sector and promote a quicker implementation of the results
- guarantee the protection of the users' individual rights in the future Internet while using new media
- create a reliable legal framework for a better IT policy that is able to catch up with international standards

Dr. Peroz said that the implementation of this strategy and the project „Afghanistan Digital 2025“ were a joint effort of public, private and academic stakeholders both abroad and in Afghanistan. Especially the young people in the country were to be engaged in this process as they were very talented and committed.

Another issue Dr. Peroz regarded as important for the economic development of the country was the establishment of a Technology Park that is supposed to help avoid electronic waste and create awareness for “green IT”. Afghanistan must not become a graveyard of electronic waste, and companies needed to be founded which could gather and process it.



Mr. Salim Saay, Head of the IT department of the MoHE, spoke about “IT Development in Higher Education in Afghanistan and the Current Status of the Development of AfgREN” (Afghanistan Re-search and Educational Network). He gave an overview of the history of IT in higher education in Afghanistan and listed some major achievements in IT like the Cisco Academy in Kabul, the ANGEL Center at Kabul University and the IT Centers at the 5 major universities (ITCK, ITCH, ITCN, ITCQ, ITCB). He went on talking about the fiber optics network for e.g. the

campus of Kabul University.

Mr. Saay went on and reported about the current state of AfgREN which is providing network infrastructure and Internet connectivity for the MoHE, the Afghan universities and other academic institutions. AfgREN is a research and educational network for Afghanistan and provides research support for higher education, high speed intranet connections between educational institutes and Internet connectivity. Furthermore, it offers facilities for distance trainings, workshops and conferences. It also provides access to international academic and research resources as well as digital libraries and virtual labs.

According to Mr. Saay, the following goals have been reached so far:

- Implementation of a fiber campus network for Kabul Polytechnic University, Kabul Education University and the Universities of Herat, Balkh, Bamyan, Juzjan, Nangarhar, Qandahar, Takhar, Parwan, Baghlan, Kunduz, Faryab, Khost, Paktya, Ghazni, Helmand, Badakhan, Samangan and Alberoni
- Implementation of a local area network for Kabul Polytechnic University, Kabul Education University and the Universities of Herat, Balkh, Bamyan, Juzjan, Nangarhar, Qandahar, Takhar, Parwan, Baghlan, Kunduz, Faryab, Khost, Paktya, Ghazni, Helmand, Badakhan, Samangan and Alberoni
- Implementation of IT centers for Kabul Polytechnic University, Kabul Education University and the Universities of Herat, Balkh, Bamyan, Juzjan, Nangarhar, Qandahar, Takhar, Parwan, Baghlan, Kunduz, Faryab, Khost, Paktya, Ghazni, Helmand, Badakhan, Samangan and Alberoni
- Establishment of a training center for the Computer Science Faculty of Kabul University, equipped with 100 PCs and connected servers

Mr. Saay stated that the network infrastructure had been project-based in the beginning and that there had been major concerns regarding its sustainability. Fortunately though, by signing a contract with the Ministry of Communication and IT, the project had gained new spirit. He said that an expansion of AfgREN to private universities was in progress and that a draft for an AfgREN policy had been completed which would define standards for the use of AfgREN.



Ms. Huma Yari, lecturer at the computer science faculty of Kabul University, reported about the “Employment of IT for the Administration in Higher Education”. She stated that the employment of IT in Afghanistan and the modernization and digitalization of the administration had started. However, there was still a need to create a culture of modernization, as the Afghan administration still mainly used paper and folders for their work. She referred to the history of administration in Afghanistan and stated that the overall general IT progress was good

in the larger cities but not quite in the Afghan provinces. This process needed funding and qualified personnel. Therefore, trained administrative staff in both the ministries and the universities was crucial.



Mr. Basir Ahmad Baheer, lecturer at the Computer Science Faculty of Kabul University, spoke about his topic “Towards an Interoperability Framework for Systems in Afghanistan”. He presented his framework for the interoperability of systems using the example of E-governance. He focused on the question how to turn bad governance (e.g. corruption) into good governance. Mr. Baheer also asserted that increasing public awareness was an important aspect to focus on.

Day 2, December 17, 2014

Video conference with President of the Islamic Republic of Afghanistan, H.E. Dr. Ashraf Ghani



On the second day, H.E. the President of the Islamic Republic of Afghanistan, **Dr. Ashraf Ghani**, spoke to the audience via video conference. He expressed his thanks for the organization of the conference and emphasized the role of Germany, especially TU Berlin. H.E. was convinced of the importance of IT for the economic and scientific development of the country. Unfortunately, as he went on, Afghanistan had lost nine years in this area. It should not only import experts and knowledge but rather build its own resources. He does not want Afghanistan to just use IT passively as consumer, but rather to actively work on it and develop it further in order to enhance the economic situation of the country. Therefore, the talented Afghan youth should be committed to this progress. He stressed that technology changed every six months and that one had to be prepared for this. At this point, universities played an essential role. Concepts for 2-, 4- and 6-year education were to be developed according to the needs of the Afghan society for qualified experts, scientists and lecturers. H.E. President Dr. Ghani expressed his regrets about the poor infrastructure of Afghanistan and especially about the poor IT security. To overcome these issues, he proposed the following 8 points:

1. higher quality of education, better qualification of lecturers
2. use of Open Source software
3. increasing the number of computer science graduates with bachelor's and master's degrees
4. selection of the best international universities for Afghan students
5. creation of minimum standards for computer science faculties
6. development of IT strategies for the universities with a planning horizon of five to twenty years
7. transfer of knowledge through students
8. creating a culture of secure and legally binding laws

At the end of his speech, H.E. President Ghani suggested to establish an IT council on a higher national government level which was to focus on the development of a national IT strategy for Afghanistan in the next five to twenty years. He wished for a fruitful cooperation in this regard. Afterwards, the presidents of the universities gave their presentations about the development of IT, necessary steps to be taken by the government, infrastructure, education, administration as well as the limitations and challenges.



As first speaker, **Prof. Habibullah Habib** spoke about the “IT Development at Kabul University” and described the current situation of the IT infrastructure, IT education and IT administration in detail. He presented information about the computer science faculty at his university, its history, current situation, academic staff and the specifications of the new building which is currently under construction. With regard to IT infrastructure, many things had changed. The university had 71 MBit/s Internet connectivity and many faculties had their own PC lab. The IT center of the university (ITCK)

provided PC workspaces for university members and network services etc. for the whole campus.

Regarding IT education, Prof. Habib continued, a faculty of computer science had been established in 2009 which had 32 lecturers today including 13 Master’s graduates from TU Berlin, 8 from South Africa and one from India. In addition, 2 PhD candidates were currently studying in Germany, 7 in Estonia and one each in USA and Italy.

Prof. Habib noted that the most urgent needs of the university were a stable power supply, construction of new buildings for the IT employment as well as computer networks for all faculties and departments. Furthermore, he expressed his wish to establish further PC labs for all faculties and departments and to improve the IT services. He praised the efforts of the ITCK and drew attention to the challenges Kabul University needed to face in the near future.



Mr. Jawed Rasuli attended the conference as representative of Prof. Amed, President of Kabul Polytechnic University. In his talk about “IT Development at Kabul Polytechnic University” he first gave a brief outline about the IT infrastructure at the university. He reported that the power supply was connected to the city power grid. The available internet bandwidth for the university was 8 Mbit/s and all buildings were connected through optic fiber connections. There was a total 10 PC labs. The IT center provided connectivity for the universities. The computer engineering and

informatics faculty had no dedicated building so far.

Mr. Rasuli went on to describe the situation regarding IT education. The computer engineering and informatics faculty, which had been established in 2009, today had three departments and 30 lecturers.

He stated that the most urgent needs of the university currently were PhD scholarships, advanced IT trainings, a building for the computer science faculty and a stable power supply.



Prof. Amanullah Hamidzai, President of Kabul Education University “Ustad Rabani”, in his speech “IT Development at Kabul Education University” emphasized the importance of computer science in both the education sector and society.

He stated that the computer science and education faculty at his university had been established in 2013 with the objective to provide computer science education for school teachers. The faculty today had seven lecturers, five of which Master’s graduates from abroad.

According to him, the most important needs of the university were stable power supply, PC labs, faculty and department networks, an IT center and higher internet bandwidth.



Dr. Abdul Zaher Mohtasebzadah, President of Herat University, reported on the “IT Development at Herat University” and the situation of the IT infra-structure at his university. He said that although it was connected to the city power grid, still there were frequent blackouts every day. The internet band-width was 16 MBit/s and there were PC labs for the faculties as well as an IT center (ITCH). The computer science faculty did not have its own building yet.

With regard to IT education, he told the audience that the computer science faculty had been established in 2007 with support from TU Ber-lin. Today it had 4 departments and 20 lecturers, 11 of which Master’s graduates from abroad. The lectures followed a practical methodology and were mostly held in English lan-guage.

The most urgent needs of the university, Dr. Mohtasebzadah stated, were a building for the computer science faculty, PhD scholarships and stable power supply.



Mr. Naweed Rahmani, Deputy Dean of the computer science faculty at Balkh University, attended the conference as representative of Prof. Mukamel Alokzai, President of Balkh University. He spoke about the “Development of IT at Balkh University”. In terms of IT infrastructure, he explained that the university was connected to the city power grid and the internet bandwidth for the campus was 8 Mbit/s. There were 4 PC labs and an IT center (ITCB). He stated that the computer science faculty did not have its own building yet.

Regarding IT education, Mr. Rahmani let the audi-ence know that the computer science faculty at Balkh University had been established in 2011 with support from TU Berlin. Today it had three departments with seven lecturers, three of which Master’s graduates from abroad. The lectures followed a practical methodology and were often held in English language.

The most urgent needs, as Mr. Rahmani explained, were the establishment of a computer science Master's program, the creation of new departments at the computer science faculty and a new building for it, the integration of the campus network into AfgREN and stable power supply.



Mr. Ahmad Zia Sharifi, Dean of the computer science faculty at Nangarhar University, attended the conference as representative of Dr. Tahir Enayat, President of Nangarhar University. In his speech about "Development of IT at Nangarhar University" he first spoke about the IT infrastructure at his uni-versity and explained that the university was con-nected to the city power grid. The internet bandwidth was 16 Mbit/s and there were 12 PC labs and an IT Center (ITCN) on the campus. A new building for the computer science faculty was to be constructed in the near future.

With regard to IT education at Nangarhar University, Mr. Sharifi told the audience that the computer science faculty had been established in 2010 with 4 departments and today it had 19 lecturers.

According to Mr. Sharifi, the most urgent needs of the university were PhD scholarships, stable power supply and a good cooperation with international universities.



Prof. Hazrat Mir Tutakhil, President of Qandahar University, spoke about the "Development of IT at Qandahar University". Regarding IT infrastructure, he explained that the university was connected to the city power grid and had its own solar power plant. The internet band-width was 8 MBit/s, there were 6 PC labs on the campus and an IT center (ITCQ). With regard to IT education, Prof. Tutakhil said that the computer sci-ence faculty had been established in 2014. Since then, it had had 5 lecturers.

He stated that the most urgent needs of the university were stable power supply, higher internet bandwidth, an increase of the IT tashkeel and a higher IT budget.



Prof. Rasul Bawary, President of Khost University, talked about the “Development of IT at Khost University”. He told the audience that the university had a computer science faculty since three years which also provided lectures for other universities. He said the power supply on the campus to be rather poor. He stressed the importance of applying IT for other fields and thus improving their performance. He expressed his wish for a better power supply at the university and for more computer science lecturers at the faculty.



Prof. Mir Ahmad Hamed, President of Said Jamaluddin Kunnar University, spoke about the “Development of IT at Said Jamaluddin Kunnar University”. With view to IT infrastructure, he stated that the power supply of the university was poor. There were nine PC labs on the campus and the total Internet bandwidth was 4 Mbit/s. Concerning IT education, he was pleased to tell the audience that the computer science faculty at his university had most recently sent one Master’s student recently started his computer science studies at

TU Berlin. He furthermore expressed his thanks to Kabul University for its support during the development of a new computer science curriculum.

He stated that the most urgent needs of the university were stable power supply, higher internet bandwidth and more CS lecturers.



Prof. Ray Montgomery, Assistant Professor at the Information Technology and Computer Science Department of the American University of Afghanistan, presented the overall concept of his university. It had been established in 2006 and, besides degree programs in political science and business and law, it also offered IT and computer science. He went on to describe in detail the focus, specifications and benefits of the ITC education at his university which fostered problem-solving skills, team-building skills and communication skills. The program followed a practical methodology where

students were to learn by doing and practicing. Furthermore, he explained that an e-learning platform (Moodle) was available for lecturers and students.



Prof. Humayun Naseri, Dean of the computer science faculty at Kabul University, presented the de-velopment of his faculty from 1994 to the present day. Enormous progress had been made since. Having started out as small department of the sci-ence faculty, it had already had 6 lecturers and 20 students in 2002. In 2009, it had gained the status of a faculty with currently 1,052 enrolled students, 32 employed lecturers and equipped with a total of 120 PCs in different PC labs.



Prof. Mohammad Hadi Hedayati, Head of the networking department of the computer science faculty at Kabul University, in his speech about “IT Services of AfgREN” reported about the concept of unified server systems within the scope of the Af-gREN project. He said that Kabul University was the interconnecting point for all Afghan universities. The AfgREN project had started in 2010 with the main purpose to interconnect all faculties and offic-es of Kabul University and then soon had been ex-tended to also cover other universities, schools, hospitals etc. Another very important aim of Af-gREN, Prof. Hedayati

continued, was to use digital services. It also provided security and authentication services, VPN services and more. Future plans included the establishment of a data center and cloud computing facilities.



Mr. Abdul Rahman Vakili, Head of IT at Herat University, presented the “Concept of Unified Server Systems for Afghan Universities”. He reported about the recent six-month IT administrator training at TU Berlin from July to December 2014. Goal of this training program was to prepare the partici-pants from five Afghan universities and the MoHE for the implementation of a unified server concept. This will allow for a better interoperability of the IT centers and help improve overall performance, as an exchange between them would then be made easier. Especially in Afghanistan, where

there was a major lack of qualified IT experts, this concept was of great relevance. Furthermore, this concept will help to counter the lack of IT experts throughout Afghanistan.

Day 3, December 18, 2014

Due to lack of time and changes in the schedule, the presentations of Mr. Yaqini and Mr. Alizai were given on the third day:



Mr. Akmal Yaqini, lecturer at Kabul University, presented the different stages of IT education. Today, Mr. Yaqini said, IT was used in research, education and management. He described the different forms of education like general IT training, technical training (administrators) and academic education (Bachelor, Master, PhD). Mr. Yaqini focused on academic education and underlined the importance of developing a curriculum that meets international standards and is tailored to the demands of Afghanistan, the capacity of the existing resources and the educational level of the students. He also

stressed the importance of memberships in the international scientific community and the necessity of training university staff members.



Mr. Ashuqullah Alizai, lecturer at the computer science faculty at Herat University, talked about the “Relevance of E-Learning” in the field of IT. First, he focused on the benefits and advantages of such a technology for teaching and learning. Then he emphasized that before implementing such a technology, a discussion should take place about its background, requirements and possible benefits. E-learning was to be considered a process which needed to comprise aspects such as the political and economic situation, available IT infrastructure, culture, social awareness etc. For its successful implementation, an effective understanding of the technology

and shared responsibilities of both teachers and students was crucial. Mr. Alizai stated that the initial costs for the technical setup and development of contents were relatively high. Major challenges, especially in Afghanistan, according to him also were stable power supply, sufficient internet bandwidth as well as pedagogical and didactic ICT knowledge.

Conclusion



Afterwards, the discussion on the talks of the past two days began and Dr. Peroz summarized the presentations on the development of IT at the Afghan universities and noted that though a lot of IT projects had already been successfully implemented in the past years, the universities were still in need of the following things:

Stable power supply, more buildings for the use of IT, IT centers, higher Internet bandwidths, further PC labs, further computer science faculties, special IT training programs for administrative and university staff, modernization of the administrations, further IT departments, IT representatives in the universities, and qualified academic IT experts like Master's and PhD graduates.

After the summary, a general discussion on concrete measures for the enhancement of IT infrastructures and IT education took place. The following measures were addressed:

Regarding IT infrastructure: Both the insufficiently developed university network and the lack of computer equipment were important points of criticism. In order to address the third problem of unequal treatment of the Afghan universities regarding their say and allocated bandwidth within the AfgREN-project, it was suggested that a work group of representatives from all Afghan universities be established, as AfgREN should be run jointly by all Afghan universities.

Furthermore, a policy document and a legal framework should be developed for the AfgREN services and fiber optic cables were to be installed in order to connect more public and private universities and to create further campus networks.

All participants of the conference appreciated the proposal to create a unified IT system for the IT centers. Due to an overall lack of qualified IT experts, this would allow a better exchange and improve the overall technical performance of the campus networks.

Regarding IT education: The participants of the conference agreed on the point that the quality of education was essential for the development of Afghanistan. Three forms of education were discussed: computer training for university staff, IT administrator trainings and academic education. Here it was also suggested to establish a work group that concentrates on the quality and curricula of all education programs. With regard to the increased number of computers and other electronic devices in Afghanistan, the necessity of raising environmental awareness and integrating it into the curricula was discussed.

At the end of the conference, Prof. Babury gave a closing speech. In this speech, he emphasized the importance of the management, e.g. extension of the IT Board and its policy. Further IT centers were to be established according to the example of the five IT centers created by TU Berlin. These IT centers were to give support to universities in neighbor provinces. Prof. Babury stated that the education at the computer science faculties was crucial for the development of Afghanistan. Here, the vision and proposals of Dr. Ashraf Ghani were to be implemented with goals and specific plans for the next five to twenty years. Prof. Babury expressed his thanks to the guests of the conference and the team of the MoHE for the organization of the event. He also thanked the Federal Republic of Germany, DAAD, TU Berlin and especially Dr. Peroz for their support.

Kabul University

IT Infrastructure

Situation of electrical power supply

- 45 % availability
- diesel generator used as backup solution

Internet connectivity and bandwidth

- 71 mbps (operational)
- maximum download 69.97 Mbps, maximum upload 9.37 Mbps

Number of PC labs

- 28 in different faculties including the ITCK with 40 computers on average
- 4 PC labs in the computerscience faculty with 50 computers each
- one brand new PC lab in the computer science faculty with 100 computers

IT Center (ITC)

- opened in 2003
- supported by Technische Universität Berlin (TU Berlin)

Building for Computer Science (CS) faculty

- currently underconstruction (UNAPS), handover and opening very soon
- capacity of 1,000 students

ITC/CS library

- in ITCK (130 books)
- in Computer Science Faculty (2,000 books on 70 topics in IT)

IT Education

CS faculty or department?

- faculty status since 2009
- from 1997 until 2009 department of the Science Faculty
- 8-semester bachelor's program
- faculty curriculum developed by faculty members and international partners(e.g. TU Berlin) according to international standards and Afghan requirements

Number of lecturers and students in the CS faculty (female/male)

- 33lecturers: 10 female (bachelor's/master's degree 4/6), 23male (bachelor's/master's de-gree 6/17)
- 23 master's graduates and 10 PhD candidates
- 760 students: 148 female/612 male

Number of graduates from the CS faculty

- 617

Number of people trained in the IT Center

- over 5,000 lecturers, students and staff members participated in various IT training sessions

- 400 students from other faculties participated in an administrator training in order to assist their faculty's staff with day-to-day operations
- 65 currently in training
- trainings for IT administrators from other universities (IT Manager Training Program)
- 41 computer science faculty members, 1,548 students and 221 staff members received computer trainings in the English Language and Computer Learning Center (ELCLC)

IT Administration

Number of employees in the IT Center

- 20

Number of administrative staff used to IT equipment
approx. 600

Which software is used in the administration? (i.e. database for students, lecturers etc.)

- Microsoft Office
- no specific application for administrative tasks
- no student or lecturer management information system
- all records paper-based

University web site? Features?

- not even providing basic requirements of a university website because of poor design (e.g. incompatibility with a variety of media (e.g. Mobile, iPad), little user interactive and boring interface) and poor functionality (e.g. no existing normalized database for storing the web-site data, localization problems)
- ITCK team is working on a professional website that is supposed to meet the requirements of Kabul University

Use of HEMIS?

- no

Most urgent needs

- create stable power supply
- construct buildings for IT use
- plan networks for all faculties and their departments
- create PC labs for all faculties
- improve IT services

Kabul Polytechnic University

IT Infrastructure

Situation of electrical power supply

- mostly stable but no UPS for server and other computers
- sometimes problems with government electricity during winter

Internet connectivity and bandwidth

- too low, only 8 MB up- and download
- often repeated connection errors (disconnection from Afghan Telecom LTD)
- all buildings connected with fiber optic cables
- inside building networking (LAN)

Number of PC labs

- 10 in total: 4 in the IT Building (120 PCs each), 5 in the Computer Engineering Faculty (ap-prox. 220 PCs), 1 in GIS Department (40 PCs)
- approx. 750 PCs in KPU

IT Center

- built in 2004 by KOICA

Building for CS faculty

- no

ITC/CS library

- planned

IT Education

CS faculty or department?

- Computer Engineering & Informatics Faculty with 3 departments
- faculty status since 2009
- from 2007 til 2009 department of the Electro Mechanic Faculty

Number of lecturers and students in the CS faculty (female/male)

- 30 lecturers: 7 female/23 male
- 700 students: 120 female/580 male

Number of graduates from the CS faculty

- 160: 30 female/130 male

Number of people trained in the IT Center

- more than 600 per year (students, admin and academic staff)

IT Administration

Number of employees in the IT Center

- 7 members: 1 IT Director, 1 Network General Manager, 1 Software General Manager, 1 Hardware General Manager, 1 Classes General Manager and 2 technical persons

Number of administrative staff used to IT equipment

- 80 %

Which software is used in the administration? (i.e. database for students, lecturers etc.)

- Microsoft Office
- Engineering programs Aoudad, GIS, Sab, Save, Revet

University web site? Features?

- CMS MCIT's
- up-to-date
- sometimes host problems
- plans for implementing web base database for the whole staff and students (graduates and under-graduates) in the features

Use of HEMIS?

- used only for students' registration since the implementation of the software

Most urgent needs

- PhD scholarships
- advanced IT training
- building for CEI faculty
- backup system for electricity

Herat University

IT Infrastructure

Situation of electrical power supply

- connected to city power grid
- frequent black outs

Internet connectivity and bandwidth

- 16 Mbps bandwidth for all faculties on the campus
- 3,5 Mbps for NOC and the CS and engineering faculty
- additional 2 Mbps for the education faculty (off campus)

Number of PC labs

- 26 (except for ITCH)
- 3 in CS faculty with 30 PCs in total
- 734 PCs in total (except for ITCH)
- ITCH: 1 with 70 PCs

IT Center

- established in 2009
- supported by TU Berlin
- provides 2 different kinds of trainings
 - user application (3 levels)
 - administrative
- provides 3 different kinds of support to HU students and staff
 - training support
 - administration support
 - technicalsupport

Building for CS faculty

- no own building though already founded in 2004

ITC/CS library

- in CS faculty: 1,297 books provided by TU Berlin

IT Education

CS faculty or department?

- faculty status at HU since 2007 (approved by the Ministry of Higher Education)
(2004-2007: functioned as faculty)

Number of lecturers and students in the CS faculty (female/male)

- 20 lecturers: 10 female/10 male (bachelor's/master's degree 11/9)
- 488 students: 128 female/360 male
- includes 4 departments:
 - Networking and Communications
 - Software Engineering
 - Database and Information Systems
 - Computer EngineeringFaculty (not active yet)

Number of graduates from the CS faculty

- 1,070 (bachelor's degree)

Number of people trained in the IT Center

1,674

IT Administration

Number of employees in the IT Center

- 29: 12 female/17 male

Number of administrative staff used to IT equipment

- 74 out of 96: 25 female/49 male

Which software is used in the administration? (i.e. database for students, lecturers etc.)

- open source software

University web site? Features?

- developed by the MoCIT, CMS Joomla(<http://www.hu.edu.af>)

Use of HEMIS?

- used to register students introduced to the faculty through the KANKOR examination

Most urgent needs

- budget for purchasing certain IT equipment (e.g. two UPS for servers) and other small maintenance parts for PC pools and servers
- budget for annual salaries
- budget for fixed costs and fuel costs for the only backup generator of ITCH (ITCH secures a massive campus network and thus needs certain hardware equipment => lack of budget)
- budget for additional costs that might arise from promoting the implementation of the campus network

Balkh University

IT Infrastructure

Situation of electrical power supply

- governmental power supply
- generator for each campus
- solar power pilot project (NATO)
- solar power for computer science faculty (World Bank)

Internet connectivity and bandwidth

- two campuses connected to fiber cable
- currently 8 Mbps (AfTEL –NATO)
- previously 8 MB (VIZADA -NATO)

Number of PC labs

- 4: ITCB, Iranian PC lab, Faculty of Economics, Faculty of Social Sciences

IT Center

- opened in 2013
- supported by TU Berlin

Building for CS faculty

☒ not yet, currently situated in the Engineering Faculty

ITC/CS library

- in ITCB (funded by DAAD, over 50 books)
- in CS faculty (funded by DAAD, over 200 books)

IT Education

CS faculty or department?

- faculty established in 2011
- includes 3 departments:
 - Communication and Operating Systems
 - Software Engineering
 - Information Database Management Systems

Number of lecturers and students in the CS faculty (female/male)

- 7 lecturers: 1 female/6 male(bachelor's/master's degree 4/3)
- 360 students: 150 female/210 male

Number of graduates from the CS faculty

- 57 (bachelor's degree)

Number of people trained in the IT Center

- 1,500 students enrolled in basic usage of systems and internet
- 40 trained system and network administrators for the faculties
- 225 trained lecturers and staff members in basic IT office usage

IT Administration

Number of employees in the IT Center

- 12: 6 female/6 male

Number of employees used to IT equipment

- 16

Which software is used in the administration? (i.e. database for students, lecturers etc.)

- 90 %

University web site? Features?

- managed by education section of ITCB
- does not support Persian and Pashto
- difficult to change the templates of single pages
- difficult to change the whole template of the website
- has been down since September 2014

Use of HEMIS?

- not anymore
- execution started in 2012, worked put poorly because of low bandwidth

Future plans

- implement a computer science master's program
- establish a new department in the CS faculty
- find/establish an own building for the CS faculty
- implement management systems for the CS faculty
- increase the internet bandwidth
- integration of the campus network into AfgREN
- stable power supply

Nangarhar University

IT Infrastructure

Situation of electrical power supply

- connected to city power (availability 70-75 %)
- diesel generator used as backup solution

Internet connectivity and bandwidth

- 16 Mbps Internet bandwidth in total allocated for five sites
 - main campus: 12 Mbps, distributed to 10 faculties
 - CS faculty: 1,5 Mbps
 - medical faculty: 1 Mbps shared with teaching hospital
 - education faculty: 1,5 Mbps

Number of PC labs

- 12 in total

IT Center

- established in 2011
- 2 PC labs with 32 PCs each
- supported by TU Berlin
- provides 2 different kinds of trainings
 - user application (3 levels)
 - administrative
- provides 3 different kinds of support to NU students and staff
 - training support
 - administration support
 - technicalsupport

Building for CS faculty

- currently located in Jalalabad City (as previously allocated to the Science and Technology University)
- 1 million dollar already provided for the construction of an own building on NU campus by the provincial administration of Nangarhar, but still lack of budget for the purchase of furni-ture and equipment for PC lab, library and departments

ITC/CS library

- planned

IT Education

CS faculty or department?

- faculty status at NU since 2010 (2005-2010: department in the Engineering Faculty)
- includes 4 departments:
 - Networking and Communications
 - Software Engineering
 - Database andInformation Systems
 - Computer Engineering Faculty (not active yet)

Number of lecturers and students in the CS faculty (female/male)

- 19 lecturers: 0 female/19 male (bachelor's/master's degree 4/15)
- 493 students: 3 female/490 male

Number of graduates from the CS faculty

- 423 (bachelor's degree)

Number of people trained in the IT Center

- 203
- 143 in training: 30 female/113 male

IT Administration

Number of employees in the IT Center

- 10

Number of employees used to IT equipment

- 80 %

Which software is used in the administration? (i.e. database for students, lecturers etc.)

- both propriety and open source software

University website? Features?

- developed by the MoCIT, CMS Joomla (<http://www.nu.edu.af>)

Use of HEMIS?

- not implemented yet

Most urgent needs

- for ITCN: voltage regulator, generator or solar energy solution, UPS

Qandahar University

IT Infrastructure

Situation of electrical power supply

- use of self-produced solar energy (60 kW)
- connected to city power grid (very unstable)
- also use of power generators
- ITCQ and other PC labs only connected to city power grid

Internet connectivity and bandwidth

- AfTEL fiber optic: 8 Mbps since 2013 (AfTEL –NATO)
- previously satellite connection: 20 Mbps (NATO)

Number of PC labs

- 6 in total
- 1 in ITCQ (established 2014)

IT Center

- opened in 2013
- supported by TU Berlin

Building for CS faculty

- not yet, currently located in the ITCQ building

ITC/CS library

- planned

IT Education

CS faculty or department?

- faculty established in 2014

Number of lecturers and students in the CS faculty (female/male)

- 5 lecturers: 0 female/5 male (bachelor's/master's degree 2/3)
- 92 students: 1 female/91 male

Number of graduates from the CS faculty

- none until now

Number of people trained in the IT Center

- 15 university staff members trained for basic network trouble shooting

IT Administration

Number of employees in the IT Center

- 11

Number of employees used to IT equipment

- basic computer knowledge: 90 % of the administration staff, 100 % of the lecturers

Which software is used in the administration? (i.e. database for students, lecturers etc.)

- Microsoft Office
- no specific database or application used for students or lecturers (their records are saved in excel workbooks)

University web site? Features?

- currently down, but will be up soon
- usually up-to-date and informative
- some application forms available
- hosted by the Ministry of Communication (MoC)

Use of HEMIS?

- used for students' registration since 2013

Most urgent needs

- sustainable power supply
- increase of internet bandwidth
- increase of the IT tashkeel
- enlarge budget for IT

December 15 – 17, 2015

IT Conference Part XI in Kabul

Conference topic: Improvement and Challenges

Day 1: December 15, 2015

Welcome and Opening



The Minister of Higher Education, **Prof. Dr. Farida Momand**, welcomed all guests to the 11th IT Conference and thanked H.E. Dr. Ghani, President of the Islamic Republic of Afghanistan and the guests for their participation. She stated that the attendance of H.E. Dr. Ghani at the IT Conference is a great honor for the MoHE. She also conveyed a cordial welcome to the

Ambassador of the Federal Republic of Germany, Mr. Markus Potzel, and the presidents, lecturers and students of the Afghan universities. In her speech she addressed the relevance of IT for higher education and emphasized that today, IT is the most important tool for higher education. She expressed her thanks to the Ministry of Communication and Technology, the world community and mainly Germany, the German Federal Foreign Office, the DAAD, the TU Berlin and especially the ZiiK for their support. Today, 22 Afghan universities are connected to the Internet, and 12 further IT Centers are going to be established soon. This year, she went on, the MoHE updated its IT strategy and is working on an e-learning platform. At last, she expressed her gratitude to all involved parties for the support with the organization of this yearly conference and gave the word to H.E. Dr. Ghani.



The President of the Islamic Republic of Afghanistan, **H.E. Dr. Ashraf Ghani**, expressed his thanks for the invitation. He commenced his speech by stating that today, technologies and knowledge are connected fields which merge and grow together. IT, as H.E. went on, penetrates many aspects of our day-to-day life and makes many processes easier, faster and more productive. He stressed that we all

have to be a part of these changes of our modern world. These changes would be most important in the field of education. The relationship between student and lecturer would have to be redefined from scratch. It is important, as H.E. stated, that we all collaborate to reach this goal. H.E. Dr. Ghani expressed his personal thanks to the ZiiK of TU Berlin for its long-standing commitment to Afghanistan and for its activities throughout the entire country.

H.E. Dr. Ghani is convinced that young women and men already made great achievements in this direction. However, there are still problems existing in today's education, as H.E. pointed out. Traditional teaching is still predominant in Afghanistan. In H.E.'s opinion, modernization

and facilitation of modern infrastructures are among the most important tasks of the government in order to make these technologies and the knowledge accessible. Therefore, as H.E. explained, he proposed to the Ministry of Communication to interconnect all Afghan universities with fiber optic cables. H.E. emphasized that we should recognize how to adapt modern technologies and knowledge to each other, because new modern technologies are important resources for the future of Afghanistan. At the end of his speech, H.E. wished all participants a successful conference and stated that he is excited to see its results and is looking forward to suggestions and ideas.



After the speech of H.E. Dr. Ghani, the word was given to the Ambassador of the Federal Republic of Germany **Mr. Markus Potzel**. He welcomed all participants and focused on the support of the German government in the area of higher education, mainly in the area of IT. He stressed that the ZiiK of the TU Berlin is active since 2002 in the construction of academic structures in the area of IT in Afghanistan. Until today, the ZiiK has established five modern IT Centers at Afghan

universities: At Kabul University in 2003, at Herat University in 2009, at Nangarhar University in 2011, at Balkh University in 2012 and at Qandahar University in 2014. As a further highlight he mentioned the computer science Master's program for Afghan lecturers. Within this program, 48 Afghan lecturers graduated from TU Berlin so far with an MSc in computer science, 25 more are currently studying at TU Berlin and in 2016, 20 more are supposed to come to TU Berlin. Mr. Potzel went on to emphasize the new project of an IT competence center in Kabul. He finished his speech by expressing his thanks to the MoHE for the invitation and by wishing the participants of the conference much success.

Keynote speeches

On the first day of the conference, in addition to the opening speeches, three keynote presentations were given on the subject of IT.

IT Development in Higher Education in Afghanistan

Prof. Mohammad Osman Babury, Deputy Minister of Higher Education, Afghanistan



In his speech, Prof. Babury gave an overview of the development in higher education in Afghanistan. Main issues were the achievements of the MoHE, the IT activities in progress, challenges of the IT development, the IT demand and the modernization of higher education.

Among the achievements of the MoHE, Prof. Babury named the AfgREN project which provided Internet connectivity to 27 public universities so far, the HEMIS project for the modernization of the administration, an e-learning initiative and the establishment of IT Centers for major universities according to the model of the IT centers which have been created by TU Berlin.

As a current activity in progress, Prof. Babury explained that the ICT (Information and Communication Technology) strategic plan of the MoHE has just been revised and extended. It includes the plan to connect eight public universities to the national fiber network, the IT assessment of all public universities, the enhancement of HEMIS and AfgREN and particularly the coordination with the donor community to meet the needs of the public universities.

The Ministry of Higher Education is embarking on one of the most important initiative in its history – the transformation of higher education to bring its quality to required high standards and to meet the tremendous need.

As Afghanistan continues to improve the higher education opportunities for its citizens, education through modern methodologies and techniques such as e-learning, objective based learning and student-centered learning approaches is underway for implementation.

Prof. Babury went on to mention that the challenges for these activities still are the general electricity supply, low Internet bandwidth and not enough ICT equipment at public universities.

In the end, he emphasized the demand for the modernization of higher education in Afghanistan like a service-oriented research and education network, campus management systems as well as access to international digital libraries and the employment of e-learning.

IT as Game changers: Challenges or Opportunities for Higher Education

Dr. Mohammad Humayon Qayomi, Chief Advisor to the President, Afghanistan



In his speech, Dr. Qayomi focused on the changes IT brought to society. Examples are increasing storage capacities, cloud computing, social media, Internet of things, big data, wearable technologies, 3D printing and many more, which are shaping day-to-day life more than ever. However, there are even more dramatic changes to be expected to come within the next years

which will also bring tremendous economic opportunities. Today, as he stated, production processes are a global endeavor and cooperation. The parts of a complex product or a music orchestra can be originating from many different areas of the world.

He went on to focus on the aspect of cybersecurity and stressed that every technology has its hidden dangers. For example, there are more than 10 million virus signatures known today, as he stated, and there is a large need for cyber hygiene by everyone. Therefore he proposed to incorporate the topic of cybersecurity in the curriculum.

All these developments and progresses also have their impact on higher education, as he explained. Higher education is also ever more important for a sufficient salary and standard of living. IT, as he states, is a “game changer” which can substantially transform the delivery of education and raise productivity, GDP, and job growth. However, it would be crucial to renew the sector of higher education so that people will become savvy users of technology in order to meet all the challenges, dangers and risks.

Dr. Qayomi advertised the “T model” of education which will provide a general broad understanding and deep technical experience in a particular area. For this to realize, the global community needs a “more globalized curriculum” which consists of global, technical and professional competence. He cited the Venezuelan socio-economist Carlota Perez: *“Technological change is not an engineering phenomenon, but a complex social interaction process involving a mix of technical, economic, social and institutional factors. Simply stated, single inventions do not change the world; widespread waves of innovation do.”*

As a consequence he requested higher education leaders to take opportunities to drive innovation and investment. Eventually, he proposed a change of paradigm of education towards enticement with content, away from lecture halls towards collaboration of students and away from grades towards continuous feedback. This way, as he finally stated, technology can be utilized as a “weapon of mass instruction”.

IT and its challenges in Higher Education in Afghanistan

Dr. Nazir Peroz, Head of the ZiiK at the TU Berlin



Dr. Peroz began his presentation by stating that the rapid development in IT has led to a central pillar of the Afghan society, institutions and universities. It changes communication – he stated that when he came to Afghanistan in 2002, no mobile phones were used by anyone in the country except by government employees. Today, there are more than 22 million mobile phones being used every day. Also, the Internet was not known to the

people back then while today, everyone is using laptops or smartphones with Internet access.

Besides many activities in the IT area by the world community and projects from international organizations, as he went on, the TU Berlin also contributed to this development with trainings for IT users, by vocational IT training programs (IT systems and network administrators) and with academic education programs (BSc, MSc and PhD programs in computer science). Furthermore, as he explained, five modern IT centers have been established at Afghan universities since 2003 by the TU Berlin. Additional activities include the establishment of an IT Department at MoHE, the development of a national IT strategy, founding of computer science faculties at the Universities of Herat and Balkh as well as an IT Board at MoHE, Alumni programs and the annual IT conference at MoHE.

Despite many achievements and successes in this field, he emphasized that a functional, secure and sustainable IT supply system is still missing at the Afghan universities. Such a supply system would consist of education, management, funding and infrastructure. This, as Dr. Peroz stressed, is one of the major challenges of the future higher education system in Afghanistan.

Such a functional IT supply system would consist, for example, of a reliable university network, secure server systems, dedicated Email systems and awareness for IT security issues and IT education and others.

According to Dr. Peroz, further challenges are the increasing amount of electronic waste, work and mobility in the digital world, and e-learning. Afghanistan would have to decide if e-learning should replace, supplement, enhance or support processes of teaching and learning. e-learning has been present in Afghanistan since 2002 and brings many advantages and chances but should not be used to grant degrees as the overall quality of education would suffer from this.

Dr. Peroz finished his speech by stating that an efficient and sustainable IT supply and its services can only be implemented if clear responsibilities are defined and the IT expertise of the staff is extended. For this, the IT Department of the MoHE and at the Afghan universities are to be strengthened in order to realize a smooth operation of the universities in teaching, research and administration. Furthermore, international IT projects are to be coordinated in a demand-driven way.

Day 2, December 16th, 2015

On the second conference day, three workshops were being held in which improvements and challenges were discussed with the following topics: “AfgREN”, Education and E-Learning” and “HEMIS”. During these workshops particular keynotes have been delivered and in the afternoon possible solutions have been discussed.

Workshop: Afghan Research and Education Network (AfgREN)

Moderated by: Ustad Niaz Mohammad Ramaki, Kabul Polytechnic University

Opening by: Mr. Niaz Mohammad Ramaki, Kabul Polytechnic University

Introduction

Mr. Niaz Mohammad Ramaki presented the schedule of the workshop to the participants. He stated there were three keynotes in the morning. In the afternoon, measures and their implementation have been discussed. Altogether, 35 persons from different Afghan universities participated in the workshop.

Keynotes

Objectives and structure of AfgREN



Mr. Ramaki, Lecturer of the Computer Science Faculty at Kabul Polytechnic University began his presentation with an overview and a general discussion about research and education networks (RENs). The Afghan Research & Educational Network (AfgREN) is a typical NREN (National Research & Educational Network) for Afghanistan.

The goal of the AfgREN is to function NOT only as an 'ISP' (Internet Service Provider) for Afghan universities, research centers, teaching hospitals and others, another goal for establishing of AfgREN is to isolate research and education traffic flow from the traditional traffic.

The AfgREN infrastructure will be set using high speed fiber links. The AfgREN is going to be the only infrastructure, and a vital prerequisite for implementing any e-platform approaches for higher education of Afghanistan. Currently five public universities are physically connected to the AfgREN by leasing an Afghan Telecom dark fiber. Mr. Ramaki hopes, in the future, the number of connected universities will increase every year. Once the number of AfgREN members has significantly grown, the AfgREN should have a central Network Operation Center (NOC) and seven regional Points of Presence (POP) throughout the country.

The AfgREN will have the council, the management committee, and the AfgREN members and each of these units will play various roles in the development of sustainability, maintainability and administration of AfgREN.

Bandwidth Management & Monitoring

Mr. Hayat Sina, NOC Manager, Kabul University

Mr. Sina began his presentation by defining the bandwidth and bandwidth policy. He then went on to speak about the total bandwidth of GEANT (the pan-european data network for the research and education community) and its distribution among all sites. GEANT provides the total amount of 155 Mbps. The major consumers are Kabul University and the Ministry of Higher Education. He then described the importance of Bandwidth Policy which mitigates complaints and provides Effectiveness and Efficiency (E&E) for the network. In addition he explained about the site survey that Mr. Sina did on November 14, 2015 for all AfgREN involved sites that are located in Kabul. This survey was like a feasibility study that gathered information mostly about the number of users at peak times, priorities and the total amount of computers. It can help to better allocate the bandwidth.

In the second part of his presentation he described the monitoring system that is being used at the AfgREN NOC office and the traffic policy which is currently in use. He went on to briefly introduce the Network Traffic that they monitor during the day. He added that the bandwidth is distributed very unevenly. Some universities have 80 Mbps and more, others only 6 Mbps. There are currently 18 universities connected via AfgREN.

The role of the IT Centers in AfgREN

Ustad Akmal Yaqini, Kabul University and PhD student at TU Berlin

In his presentation Mr. Yaqini talked about the importance of IT centers for Afghan universities. The role of an IT center in an university is to create and enforce ICT policy and strategy, create and maintain a stable IT infrastructure for the university and to provide basic IT services and necessary IT trainings. These tasks are crucial for the operation of AfgREN. Currently there are five IT centers established at Afghan universities receiving technical as well as financial support. The first IT center (ITCK) was built at Kabul University in 2003.

After decades of war the ITCK was the first institution of information technology in Afghanistan. Following that, the ITCH was established at Herat University in 2009. The staff of the ITCK was periodically trained at TU Berlin and gained much practical experience in the field of IT. As a result the expertise from ITCK was used to establish other IT centers across the country; the IT center of Nangarhar University (ITCN) in 2011, the IT center of Balkh University (ITCB) in 2012 and the IT center of Qandahar University (ITCQ) in 2014.

It is planned to establish IT centers at 12 more universities in Afghanistan. The project will be funded by the World Bank. The five existing IT centers established by the Ziik of TU Berlin are successful examples to be used for establishing new IT centers at other Afghan universities.

Furthermore, he recommends that the five existing IT centers act as IT competence stations in five zones and participate in supporting other IT centers in the future. He also suggests that all IT centers at Afghan universities should host a unified server system and structure. For this reason the ITCK has conducted a national IT training in three phases which included participants from 20 universities around the country.

Discussion

After the presentations, there were collaborative discussions among the participants. Some of the participants expressed their problems regarding the Internet situation, the lack of or incomplete intranet, and the lack of ICT centers at their universities. Others have suggested reasonable solutions for their concerns. In the following, questions from the participants have been discussed:

Problem 1: Internet traffic should be filtered at the universities, unethical websites should be banned

Solution: A set of IT regulations has to be created and implemented for all universities in order to avoid such problems.

Problem 2: Some participants complained about low Internet bandwidth and the lack of IT technical staff as well as ICT centers.

Solution: Mr. Ramaki explained that there is allocated bandwidth to each university based on the number of users and staff of the university. The MoHE plans to work on how to solve/reduce this problem for all universities. In the near future the IT administrators and staff would be trained either in Kabul or in other provinces.

At the end of this workshop, the participants agreed on the following suggestions:

- Implementation of a nation-wide wifi access at the Afghan universities like the European “Eduroam”
- Emphasis on implementation of Univention-based Linux systems (Univention Corporate Server, UCS) at the universities' IT centers
- The UCS trained administrators from TU Berlin are to be requested to develop the UCS implementation plan
- Using IPv6 during the implementation of AfgREN
- A set of ICT regulations should be developed for the MoHE
- Prioritizing using open source systems/software at universities
- Preparing trainings and creation of awareness for the employment of open source solutions
- The AfgREN should get an organizational structure

Workshop: Education and E-Learning

Moderated by: Ustad Foawziah Naseri, Herat University
Ustad Hassan Adelyar, Kabul University

Opening by: Ustad Abdul Rahman Sherzad, Herat University and PhD Student
at TU Berlin

Introduction

Mr. Hadelyar, Lecturer of Computer Science at Kabul University and Mrs. Naseri, Dean of the Computer Science Faculty at the Herat University, presented the schedule of the workshop to the participants. They stated there were four keynotes in the morning. In the afternoon, measures and their implementation have been discussed. Altogether, more than 50 persons from different Afghan universities participated in the workshop.

Keynotes

Challenges for Education in Afghanistan

Ustad Abdul Rahman Sherzad, Herat University and PhD Student at TU Berlin



With his presentation "Challenges for Education in Afghanistan", Mr. Sherzad reviewed the developments and challenges in the emergence of modern education in Afghanistan, the structure of the education system, and the consequences thereof.

In this presentation, the term "modern education" refers to public schools that are run by the government with a standard syllabus that includes natural science as well as social and historical studies with a minimum of Islamic studies. This is in distinction to the traditional education known as Islamic or religious school (Madrasa) that refers exclusively to religious-oriented form of education where the children learn the fundamentals of Islamic religion with basic reading and writing skills in mosques and private homes. Traditional education in mosques are run and funded by the community.

The applied sources related to the history of education in Afghanistan show that modern education in Afghanistan began in 1875 with the establishment of schools for civil and military purposes by the royal family. Subsequently modern schools were re-introduced with the founding of Habibiya School with elementary, lower and higher secondary education levels. The development of many general and vocational schools in Kabul and other major cities led to the formation of the Ministry of Education (MoE) in 1922. Next, due to the expansion of

institutions of higher education in 1970, the Ministry of Higher Education (MoHE) was formed in 1977 to consolidate the country's institutions of higher education.

The main aim is to discuss the factors that have impacted the growth of modern education in Afghanistan. For example, external aggression and war, political use of educational institutions, intervention of external powers, radical and rapid change in cultural and traditional aspects, lack of literacy and knowledge, lack of qualified human resources and teaching materials, etc.

In this presentation, the author proposes the following recommendations for improving the quality of education in Afghanistan:

- Establishment of Kindergartens and pre-schools in major cities,
- A dialogue and harmony between Madrasa and public schools for creating a better understanding between the more secular public schools and the religiously oriented Madrasa,
- Offering specification studies upon successful admission to higher secondary schools,
- Establishment of a strong and close cooperation between MoE and MoHE,
- Emphasis on completing the syllabus in schools properly by the Ministry of Education through efficient monitoring and evaluation mechanisms,
- Teachers training seminars and building capacities for professional teachers.

E-Learning specifications and challenges

Ustad Ashuqullah Alizai, Computer Science Faculty at Herat University

According to his research, as Mr. Alizai stated, E-Learning and the drastic usage of new technologies in education have recently become a solution to lower universities' costs and to increase teaching quality. E-Learning can be a key to revolution and modernization of a passive education system. This change can be by revising the traditional teaching techniques and substituting them with new effective and more responsive ones in all education sectors. The technology-based application will be more perceptible in this regards.

E-Learning in its very definition means the delivery of a learning, training or educational program by electronic means such as Computer, mobile phones, Internet, multimedia etc...

The context of E-Learning derived from distance education which means learning that takes place with the instructor and learner(s) in physically separate locations. It has different types and generations, which are based on technology evolution. E-Learning fits on third and fourth generations of distance education which rely on Internet and multimedia technologies. Currently, Afghanistan has no underlying foundation to carry out distance education and there has been no regulation developed for it. However there is a policy plan for implementing this kind of education in the near future through the MoHE. Deployment of distance education in Afghanistan depends on the political situation, economies, telecommunication status, IT infrastructure, culture behavior, society awareness, literacy rate both institutional and social, commitment of stakeholders especially institution, instructors and learners.

Many problems were discovered concerning the implementation of distance education in Afghanistan such as the electricity problem, high Internet costs & low bandwidth, mail problems and accessibility to materials, the lack of ICT knowledge, lack of ICT infrastructure, low literacy rate both social and institutional and social awareness and the most important one, the lack of expertise. It has been noticed that the pedagogy concerning distance education

is totally different from conventional education. For distance education he identified the following three areas as relevant:

1. the dialogue between instructors and learners
2. the structure of a course
3. the autonomy of learners

Furthermore he listed some issues and challenges as below:

1. Innovative teaching ability to utilize technologies and facilities for effective teaching
2. Effective understanding of shared responsibility between the instructor and learner
3. Initial costs are high and the cost of developing course content is significant
4. Need to integrate all tools including the authoring tools, the learning management systems and other HR applications

Relevance of E-Learning: A feasibility study on implementing blended learning at Balkh University: Challenges from a micro-perspective

Ustad Nasim Sadat, Computer Science Faculty at Balkh University

Mr. Sadat spoke about the relevance of E-Learning and presented a feasibility study on implementing blended learning at Balkh University.

Due to Mr. Sadat it is crucial to assess the context for which a strategy is being designed before taking action in designing a national E-Learning strategy. In order to architect a context tailored, sustainable, long-term and realistic E-Learning strategy, a scientific discourse needs to be created to answer questions such as: What are the challenges we face in implementing E-Learning? How e-ready is Afghanistan for digital education? To find answers to such questions, Mr. Sadat undertook a study at the Center for Information Technology and Research at the faculty of Computer Science at Balkh University. Hybrid learning methods were applied in a class of mathematics to explore the challenges emerging during classes. The results of the study reveal that the university does not fulfill basic requirements on different levels which are crucial for taking advantage of IT to enhance the quality of education. The lack of a sound technical infrastructure such as an unreliable power supply and Internet connection, the lack of sufficient know-how in using digital systems, the lack of a legal framework and an inflexible social environment were seen as major challenges.

The results on the other hand, highlighted, if put properly in place: IT can enrich and enhance the quality of education effectively. It concludes that introducing hybrid learning technology in Afghanistan can only be successful if the challenges outlined in this study are addressed effectively.

Measures need to be taken to improve the technical infrastructure, put appropriate policies in place and raise the capacity of the staff and users utilizing digital technology. Further relevant aspects such as the level of IT-literacy and self motivation of students need to be further investigated.

Introducing E-Learning in Higher Education of Afghanistan: Progresses & Challenges

Mr. Bahadur Hellali, Higher Education Development Program (HEDP) at the MoHE

The presentation of Mr. Hellali covered MoHE's E-Learning plan and policy. The presentation was mainly focused on the goals, implementation approach and progress made to the date. In addition, the presentation also covered additional aspects of E-Learning in developing nations such as contextual framework and E-Learning prerequisites.

MoHE is undertaking a new initiative to modernize higher education in Afghanistan by integrating modern teaching approaches and E-Learning. As Afghanistan continues to improve the higher education opportunities for its citizens, education through modern methodologies and techniques such as E-Learning, outcome-based education and student-centered learning must be considered. With the E-Learning initiative, MoHE will collaborate with Afghan public universities to integrate technology into the learning environment, provide greater access to alternative education and globalize education via electronic access for information and to experts worldwide.

The E-Learning initiative heavily relies on stable ICT infrastructure, well formulated rules and regulations and elevated knowledge of academic members in the area of modern teaching and learning techniques. Initially, MoHE will pilot and implement the E-Learning initiative in eight major public universities: four major Kabul-based universities, Herat University, Balkh University, Nangarhar University and Qandahar University. To this day, E-Learning committees have been established in each of the aforementioned universities and they have developed their plans for next three years in the area of E-Learning.

In the end of presentation, the E-Learning group participants had an interesting discussion on the presentation.

Discussion

After the presentations, the workshop participants discussed very controversially about the employment of E-Learning. Most importantly, it seems necessary to specifically define what E-Learning actually is.

The following questions were asked by the audience:

- Are the lecturers and students ready for E-Learning?
- Do universities have the capacity and ability to introduce and implement E-Learning?
- Is it possible to have pure Distance Learning / E-Learning?
- Basics of E-Learning i.e. using Email and social media for academic purposes are already there, but how much time will it take to take over traditional teaching and learning?

It was replied by the participants that the main goal and objectives of MoE and MoHE should be standardization and quality of education rather than quantity.



Some of the participants stated the employment of E-Learning can be difficult in the beginning, but once established, the following assets can be used over again; but designing an online course and transferring web based study materials requires a lot of time and accountabilities e.g. online texts, other resources, online discussion and chat, interactive content (animation, PowerPoint, audio, video, CD), submission of assignments, self-

assessment activities (Quizzes), methods of assessments, glossary terms and more. Therefore, devotion and commitment of the lecturers are very crucial and essential for the enrichment of education through E-Learning. He continued that most of the lecturers unfortunately do not have much responsibility for their duty.

The participants then discussed about the reality of today's situation, for example that lecturers sometimes use outdated lectures, are not paying serious attention and research while preparing slides, have low writing skills, etc.

It was added that the MoHE policy draft proposes a period of three years for the enrichment of courses and five years to issue online degrees, if everything is running smoothly.

It was proposed that lecturers should acquire technical knowledge in order to create a culture of using learning platforms and to develop a policy for E-Learning.

A suggestion of the conference participants was to use the term "Basic IT education for universities" instead of E-Learning, because the term E-Learning may be too general.

Some participants complained about the lack of budget which leads to a lack of infrastructures including a lack of buildings, a lack of professional lecturers, a lack of pedagogical concepts for E-Learning, a lack of establishing a new department, etc. How is it possible to implement E-Learning when having such obstacles and challenges on the way?

Almost all the participants agreed that E-Learning is a good step for the enrichment and support of lectures, but it should be realized step-by-step and not be used for issuing degrees.

Workshop: Modernization of the Administration in Higher Education

Moderated by: Ustad Ghezal Ahmad Zia, Kabul University

Opening by: Mr. Ghezal Ahmad Zia, Kabul University

Introduction

Mr. Zia, Lecturer of Computer Science at Kabul University, presented the schedule of the workshop to the participants. He stated there were three keynotes in the morning. In the afternoon, measures and their implementation should be discussed. Altogether, more than 25 persons from different Afghan universities participated in the workshop.

Keynotes

The importance of HEMIS for the Afghan administration



Mr. Zia started his presentation by asking two questions:

What problems and challenges have been faced in the HEMIS implementation processes?

What are the key issues that need to be identified for successfully extending HEMIS?

A Management Information System (MIS) is a set of interrelated components such as people, tools, hardware, software, communication network, data resources, and procedures that collect, process, classify, store and distribute information to support decision-making and control.

MIS can help the managers to schedule their activities in an organization. As a result the MIS will support the manager in her/his decision-making process. The main aim of this presentation was to make clear that understanding the role of MIS in an organization is vital because the MIS provides accurate, timely information for the manager to proceed the decision-making in a feasible way. Mr. Zia pointed out that the MIS plays a great role inside each organization. It takes the raw data and processes it into information, which is understandable to different departments of that organization for appropriate decision-making. With the growing of the staff or the number of students at a university, keeping related data of employees or creating reports will be crucial aspects for the decision-making process of that organization. Therefore, Mr. Zia argues for replacing the paper-based systems with computer-based systems as a solution for any business process. This workshop is an attempt to define a concept for the main role of an MIS in an organization and to show how it will help the top management.

MIS has three levels: the operational level, the middle management and the top management. The information flow is from bottom to top. There are a lot of organizations today that are using management information systems, such as banks, ministries, telecommunication companies and even small business organizations. Due to Mr. Zia the use of management information systems can facilitate the work procedures and improve productivity and performance.

The challenges that they have faced with HEMIS:

- Shortage of staff, competence of staff, poor data storage, financial constraints, shortage of material, bulk of unprocessed data, non coordination of data and data-related processes, poor distribution of information and material, leadership problems, and more.

The proposed solution is a concept of a distributed system (Distribute MIS) that should be expandable, flexible and usable at low cost (Open Source technology). The system should be developed with the Agile methodology or spiral model to complete the business mapping and all requirements.

After the presentation the benefit of the distribution of such a system was discussed. It was declared that each university should be responsible for their own system while the MoHE should have access to its own. The participants have seen no need that all the data of the universities should be stored at the MoHE.

Creating awareness for the requirements of modern technology for the administration

Ustad Naweed Rahmani, Computer Science Faculty of Balkh University

Mr. Rahmani stated that the usage of emerging technologies has been an efficiency requirement for administration and workplaces for a long time. The same necessity is also noticed in administrative offices in Afghanistan. Organizations strive for better management and effective administration and this is concomitant to the usage of emerging technologies. Mr. Rahmani thinks that it is crucial to raise awareness among administrators in Afghanistan to know about the importance of emerging technologies for better management. Though it is not a new item in learning and teaching, still the adoption and use of emerging technology shall be promoted and awareness shall be raised within the workplaces in Afghanistan. Mr. Rahmani described the current situation of emerging technologies in Afghanistan and further explained the challenges and issues. In the end, he made the following suggestions:

One of the challenges in adopting an emerging technology in administration in Afghanistan is the lack of awareness and knowledge of Information Technology by most of the lecturers and administrative staff. There are still lecturers at Universities who use hard copied lecture notes and who have no idea what a presentation slide means. Staff in the Universities also still use pen and paper for official work processing and don't know how to use a personal computer.

At the end of his talk he concluded that it can be possible to promote the usage and adoption of new emerging technologies in administration through awareness workshops and campaigns. The practitioners will know the importance of technology in education and adopt it for an effective management and a better future.

Scholarships Management Information System (SMIS)

Mr. Abdul Hai, MIS Manager at ITCK, Kabul University

Recently, Mr. Abdul Hai developed a SMIS for MoHE under the supervision of Mr. Ghezal Ahmad Zia. During his speech, he presented the results of his work.

He explained that SMIS is a module inside the HEMIS system which is implemented using new web technologies. The design and implementation was done on behalf of the MoHE. The Scholarships Management Information System is a large database system, which can be used for managing and storing the types of scholarships information electronically. It is a multi-client system and can be used by several users at the same time.

Specification of scholarships:

- Bachelor
- Master
- PhD
- Short term courses
- Agreements

Functionalities and features of the new system are implemented and designed according to the data received by the MoHE.

Functionalities and Features:

- Type of user-accounts according their privileges
- Super admin full privilege
- Section admin for directors
- Section admin for staff
- Each user can access the system separately without interfering the other user session
- Can easily create reports for all types of scholarships
- Agreements
- Uploading attachments
- Downloading a candidate's file
- Searching, updating and inserting records.

Use of Technology:

- HTML 5
- Laravel 5.1 (PHP framework)
- Session
- JQueryUI
- AJAX
- JavaScript
- Servers Apache 2

Discussion

The participants of the workshop stated that the employment of HEMIS so far has not been successful. This is due to a number of reasons: The system itself, the technology, the infrastructure and mostly a lacking awareness of the staff. After a long discussion, the participants proposed the following:

- A unified training manual (Basic, Intermediate, Advance) shall be drafted
- A national program for awareness of modern technology shall be implemented
- Goals for use of technology in Administration have to be defined
- IT department and Computer science faculties in all Universities shall organize workshops and awareness campaigns.

Furthermore, a new plan for the successful implementation of HEMIS was discussed. As a result it was suggested that the MoHE and the Universities should be connected, AfgREN should be extended and the local traffic should be implemented. The main focus however was the role of the IT centers (currently five IT centers established by the ZiiK of the TU Berlin) as a functional IT center. The planned new IT centers with funding from the World Bank should also implement the unified system structure (based on UCS).

Moreover, the usage of Open Source technologies for the development of an extended HEMIS was discussed and all of the participants agreed with that. Within the discussion the IT policy was one of the most important aspects.

Third Day: Thursday, December 17th, 2015

Moderation: Prof. Osman Babury, Deputy Minister of the MoHE,
Dr. Nazir Peroz, Head of the ZiiK of the TU Berlin and
Mrs. Shukria Jamal, Head of the IT Department of the MoHE

Presentation of the Workshop Results

The aim of the last conference day was to discuss the results of the three workshops. The results of the workshop "**Objectives and structure of AfgREN**" were presented by Ustad Akmal Yaqini, Kabul University. The outcome of the workshop "**Education and E-Learning**" was presented by Ustad Hassan Adelyar, Kabul University. And the conclusion of the workshop "**Modernization of the Administration in Higher Education**" was presented by Ustad Ghezal Ahmad Zia, Kabul University.

Results of the Workshop AfgREN



Ustad Akmal Yaqini, Kabul University and PhD student at TU Berlin began with a short summary of the presentations from the previous day. After this, he explained that the workshop contributions showed the current situation and demand. More than 25 persons took part in this workshop.

Regarding the AfgREN project, the following points were suggested:

- IT administrator trainings for provinces
- UCS implementation in new ICT centers
- MCIT collaboration with MoHE
- Internet up-link request via central Asia
- IT policy development
- Emphasis on open source technologies
- Separation of ICT centers from computer science faculties
- Replacement of GEANT connection
- Implementation of a nation-wide wifi access at the Afghan universities equal to European "Eduroam"
- Using IPv6 during the implementation of AfgREN
- Organizational structuration of AfgREN

All in all, the workshop participants agreed that it would be crucial to interconnect the Afghan universities with the same high bandwidth, according to international standards (>10Gbps) and on a toll-free basis. This bandwidth would be technically feasible via the existing fiber optic cables, even though the connectivity to the public Internet might still stay limited for some time. The organizational structure of AfgREN should be carried by its members and without economic interest. Only this way, the exchange between the universities for research and education would be supported in a stable and sustainable way.

Results of the Workshop “Education and E-Learning”

Ustad Hassan Adelyar, Kabul University



First, Mr. Adelyar stated that the discussion of this workshop focuses on three aspects: Enrichment, Integration and Virtualization.

He referred to the presentation of Mr. Sherzad about the development of higher education in Afghanistan. After that, he explained some of the definitions and goals. In general, E-Learning aims on providing greater access for students on a range of learning material independent of time and

place.

It should be considered, as he stated, that E-Learning is not to be understood as an alternative education delivery system but as a tool to enrich and support the current education system with integration of Information Technology. The goal of “offering fully online courses” is neither realistic nor feasible within the proposed implementation time frame of the MoHE.

The ultimate objective of E-Learning, as Mr. Adelyar explained, should be only support and enrichment for educational institutions. Not for issuing certificate degrees for undergraduate and postgraduate programs. The sustainability of the E-Learning policy should also be taken into consideration. In order to ensure sustainability the implementation plan should not be project based and should be integrated into the framework of the MoHE.

As a summary, the following proposals were made:

3. Strong and close relationship and collaboration between MoE and MoHE
4. MoHE should not consider E-Learning as an alternative education delivery system but as a tool to enrich and support the current education system with integration of Information Technology (IT), for example in the form of Learning Management Systems or Massive Open Online Courses (MOOCs)
5. The main objective of E-Learning should be only enrichment and improvement for education sectors, not for issuing certificate degrees for undergraduate and postgraduate programs
6. E-Learning should not be project based but instead be integrated into the MoHE framework.

Results of the Workshop “Modernization of the Administration in Higher Education”

Ustad Ghezal Ahmad Zia, Kabul University



Mr. Zia presented the results of the workshop from the previous day. He spoke about the role of MIS in an organization, the extension of HEMIS and proposed solutions. In particular, he mentioned a SMIS module for HEMIS and raising user awareness.

The workshop participants suggested to employ the existing HEMIS at the universities. At the same time, a new HEMIS should be developed from scratch until

2020 using Open Source technologies.

A unified training manual is to be drafted on basic, intermediate and advanced level. Also, a national program to raise awareness for modern IT is to be implemented. Goals for the use of technology in Afghanistan are to be defined and workshops as well as awareness campaigns are to be realized.

For the implementation of HEMIS, a functional AfgREN is necessary. Also, the role of the IT Centers is to be strengthened and they should be supplied with a unified system based on Univention (UCS).

Finally, an IT policy is to be developed with an emphasis on Open Source technologies.

Conclusion



After the presentation of the three workshops Prof. Babury expressed his thanks to the speakers of the workshops.

The main focus of the final discussion was the employment of E-Learning. Some of the participants first requested a definition of the term “E-Learning” to have a better understanding what it is about. The E-Learning policy draft of the MoHE did not discuss the

particular meaning of E-Learning and how exactly it is to be employed - as support for teaching or to replace it.

Prof. Babury addressed the questions of some of the participants and emphasized that this is a great chance for the Afghan education system to embrace new teaching methods by using E-Learning facilities. With them, the initiatives of the MoHE for the improvement of the higher education quality in Afghanistan are to be pushed forward.

As has been reported during the workshop about “Education and E-Learning”, MoHE plans to implement virtual education until 2020. However, many of the participants agreed that, before the widespread implementation of E-Learning, the particular situation in Afghanistan is to be considered in terms of infrastructure, didactic methods as well as teaching and learning culture. In this context it is important to specify which particular E-Learning facilities can be considered for the best possible outcome and success.

Dr. Peroz stated that he encourages the employment of E-Learning tools to support research and education. Many lecturers and students from Afghan universities are doing this already. However, as he went on, he opposes E-Learning projects in form of virtual lectures and the issuing of online degrees in Afghanistan. He stressed that such forms of teaching will create great challenges for the universities to which they aren’t prepared for yet. They would not only harm the quality of the Afghan education system but also cause severe problems for the development of the Afghan society and economy in the long run.

He rather proposed to issue MSc and PhD scholarships to lectures and students in order to study abroad. He went on to propose to develop concepts for the implementation of student-centered learning and outcome-based education at the Afghan universities. A sustainable employment of E-Learning at the Afghan universities, as he stressed, has to be considered a complex campus-wide process. This process would have to begin with an analysis of the current situation of education in direction of the development of a strategy, conception and realization up to quality assurance and evaluation. Challenges and structural requirements would have to be considered, too.

The audience raised the issue that the employment of powerful local computer systems, data centers, PC labs for the faculties, standardized management and office solutions as well as network-based means of communication and E-Learning are depending on an efficient infrastructure.

After a long discussion, Prof. Babury stated that it is not about virtual teachings and online degrees but about using E-Learning for the support and improvement of the lectures.

After this discussion, the two topics of the workshops on “Afghan Research and Education Network” and “Modernization of the Administration in Higher Education” were discussed. Regarding the AfgREN project it was agreed upon that it is crucial to interconnect the universities with high bandwidth, even if the Internet connectivity in Afghanistan is still limited. This is feasible via the existing fiber optics connections and should be free of charge for the universities. For the future, further Internet peerings with other countries (not Pakistan, though) should be established.

Regarding the HEMIS project, the participants agreed to make the use of HEMIS mandatory for the universities. It can, however, be used in parallel with existing management information systems, if required. The HEMIS system is to be extended and rewritten from scratch using Open Source technologies.

The presidents of the universities of Qandahar, Nangarhar, Kunar, Faryab, Baghlan, Bamyan, Badakhshan, Kunduz, Samangan, Jawzjan and Ghazni drew the audience’s attention on their particular needs, like network planning for the IT supply at their universities, high-bandwidth Internet connectivity, reliable power supply, buildings for computer science faculties, IT education and further trainings as well as an IT regulation policy.

Prof. Babury addressed the responsibility of the universities and stressed that the MoHE and the Afghan universities have achieved a lot already.

In the end Dr. Peroz thanked H.E. Dr. Ashraf Ghani, the President of the Islamic Republic of Afghanistan for his opening of the conference. Furthermore he thanked Prof. Dr. Farida Momand, Prof. Osman Babury as well as the presidents of the participating universities for their support. He also thanked the German Federal Foreign Office, the German Embassy in Kabul and the DAAD for their support and funding of the conference. He expressed his gratitude towards Mrs. Shukria Jamal, Mr. Ghezal Ahmad Zia, Mr. Niaz Ramaki and the other employees from the IT department of the MoHE and the team of the ZiiK at the TU Berlin for their tireless efforts and the organization of the conference and the workshops. At last he thanked all conference guests for their contributions.

Prof. Babury also thanked the participants and the ZiiK of TU Berlin for the good cooperation. At last, the president of Kunar University, Prof. Mir Ahmad Hamed closed the conference with a prayer.

December 18. - 20.12.2016

IT Conference XII in Kabul

Conference topic: Cyber Security

Day 1: December 18, 2016

Welcome

Prof. Dr. Farida Momand, Minister of Higher Education Afghanistan



welcomed all honorable guests to the 12th IT Conference. She said to be very happy to celebrate the 12th in a series of annual IT Conferences at the Ministry of Higher Education. She expected that this conference will grow the knowledge of the academic and administration staff and define the importance of IT in all organizations. Prof. Momand confirmed that the MoHE is committed to increasing the usage of IT such as accessing information worldwide, education and training, communication, and

more. IT, as she went on, can have useful impacts on good governance like reducing overload, increasing transparency, easy accessibility, storage, and generation of reports.

Reflecting on the conference topic, she stated that IT services across the country, like nationwide email systems, the Higher Education Management Information System (HEMIS) which store sensitive data and many other services need protection against cyber-attacks and other threats.

She continued to talk about the 2nd IT strategy plan of the MoHE which is to establish and extend the IT Infrastructures like fiber optic cables and its related services with priority. In this strategy, as she pointed out, there are the following main objectives: Improvement of the IT infrastructures and maintenance, establishing of IT centers at the Afghan universities, localizing IT traffic, improving and extending AfgREN, establishing connections between the MoHE and the universities, as well as between the Ministry of Education and other related organizations.

Prof. Momand went on to explain that for the usage of IT in good governance, the following programs are to be implemented: Extension and implementation of HEMIS at the MoHE and at least eight universities, providing services via websites, increasing the bandwidth of Internet connections, creating IT policies for users, increasing employees' capacities, and increasing privacy awareness.

As further applications of IT in the academic field, Prof. Momand named the creation of secure connections for universities to international digital libraries, establishing digital libraries for Afghanistan, effective usage of AfgREN services, improvement of the education by the usage of IT, providing e-campus and e-learning services, as well as creating an IT culture.

Further activities include the establishing of IT centers at Ghazni, Khost and Kabul Education University, which are to be completed by the end of this year. Further IT centers are planned to be established by HEDP until end of 2020.

She expressed her hope to have secure infrastructures and good services at the MoHE and the Universities through the implementation of the mentioned programs, and she thanked the organizers of this year's conference about Cyber Security. Through these conferences, as she was sure, users will be aware of attacks and will be able to protect their systems.

She went on to especially thank TU Berlin for supporting the MoHE. She expressed her particular personal gratitude to Dr. Peroz for his long-standing commitment to Afghanistan and for his activities throughout the entire country by establishing IT centers, educating academic staff in MSc and PhD levels and the series of IT conferences since 2002.

Prof. Momand finished her speech by stating that she hoped the results of this conference will help to protect data and systems in Afghanistan.

Opening

H.E. Mrs. Rula Ghani, First Lady of the Islamic Republic of Afghanistan

H.E. Mrs. Ghani delivered her opening speech via video message.



H.E. Mrs. Ghani expressed her happiness to speak today to the educated young generation of Afghanistan and she thanked the students and the young generation who just came back to their homeland after completion of their studies in Germany in order to help and build up their country. Even though these students, as she continued, know about the problems of the country, they still wanted to serve and struggle

for Afghanistan and be a role-model for other young people. She expressed her confidence that the new generation is able to apply their good ideas and experiences to build up this country.

H.E. Mrs. Ghani went on to thank Dr. Peroz for his efforts to educate these graduates and for his concept for the future of Afghanistan. She praised him for his great job in the area of IT.

She emphasized that Information Technology and Cyber Security are one of the major global tasks of our time. Therefore, it makes her proud that there are numerous Afghan students active in this area today. She stated that today we are living in a world of technology, which has advantages and disadvantages. Therefore, information and education in this area, as she added, is one of the major requirements of society today.

She pointed out that recently there were reports of hackers who manipulated the voting system during the presidential election in the USA and that there are increasing numbers of incidents of unauthorized access to bank accounts or personal emails, which also results in privacy infringements of the victims. She stressed that now there are information security experts in Afghanistan who are aware of such attacks and who are able to counter them and protect sensitive data. She was confident that the young educated generation in Afghanistan now is equipped with the knowledge to use the new technologies to bring Afghanistan into the 21st century.

H.E. Mrs. Ghani finished her speech by wishing all the best and much success to the brave young generation of Afghanistan and for their future careers.

Mr. Walter Haßmann, Ambassador of the Federal Republic of Germany



Mr. Haßmann began his speech by stating that in terms of information technology, he can still remember the old days of researching solely in books in libraries in order to find information. Today, however, he said he is, like everybody else, a regular user of the Internet and of information technology facilities.

Furthermore, as he continued, no organization of today could function without the new technologies, and everything is getting faster and smaller. He confirmed the subject of this conference, "Cyber Security", to be chosen very wisely, as there would also be a "dark side" to this development, too.

He stressed that IT security affects us in two ways: On the one hand, regarding the protection of our personality, thoughts and identity, and the digital secrets we have, and on the other hand, regarding the safety and security of governments, countries and nations, and their secrets. Mr. Haßmann gave the example of the accusations of data manipulations and cheatings between the USA and Russia which made the news recently. To him, this draws a frightening image.

Therefore, he suggested to stay critical on a personal level and to not digest everything which is offered digitally. Similarly, nations and governments have to protect themselves against digital crimes and data theft. However, as he added, freedom and liberty in the electronic world should not be sacrificed.

Electronic media, as he went on, offers tremendous opportunities for learning, for management, the administration, and for increasing individual knowledge and skills. He emphasized that experts in the IT field would have an enormous responsibility of walking the very fine line between chances and risks of information technologies.

Mr. Haßmann finished his speech by encouraging the audience to continue the good work in this field, given the fact that individuals, governments and whole nations are depending on IT experts. He thanked all participants for their past contributions in this area and hoped for a fruitful conference and for the development of new ideas, new ways and new technologies to protect our IT infrastructures.

Mr. Ajmal Marjan, Deputy Minister of Information Technology at the Ministry of Communications and IT, Afghanistan



Mr. Marjan began his speech by congratulating the Ministry of Higher Education for continuing the tradition of the annual national IT Conference for the past 12 years. He especially thanked Dr. Nazir Peroz for his commitment and dedication for all his efforts in the field of computer science in Afghanistan.

Mr. Marjan stated that IT is present in Afghanistan for quite some time already, as it was introduced to the country already in 1975 and 1976, when the first IT Center was established by Mr. Malikzai. Mr. Marjan used the opportunity to thank Mr. Malikzai who was present in the audience.

He continued to explain that the nation had taken a break during the civil wars which prevented it from walking step by step with other nations. Fortunately, as he went on, the nation grew together in the past 15 years and it learnt how to employ the new technology along with other nations. However, as he added, like all other things, technology has positive and negative aspects. When traditional processes are being transformed from manual to computerized systems, certain issues need to be taken care of, as it's impossible to achieve 100 % control over data in electronic form. Therefore, Mr. Marjan expressed his gratitude towards Dr. Peroz for selecting the important issue of Cyber Security as the topic of this conference.

When new technology arrives, it brings some new terminologies with it. "Cyber" is also one of those words: If we translate this word to our language, then it will lose its originality. Cyber is the space in which any object communicates with any other object in electronic form. It covers our telephonic conversations, all satellite communications, banking transactions, radar communications, electronic libraries, data of all organizations, ministries, courts, etc. Now if cyber is expanded to such a huge extent, then what do you think about its importance? How complex will it be? How important will its security be? It is very easy to secure this conference hall, as it has limited doors and windows. If you appoint guards on each entrance, then the security of this hall can be ensured. But if we consider cyber, its complex structure, its huge size, etc. then it is very difficult. The first problem is that the components along with its users are all heterogeneous. Someone is working in a bank, someone is surfing the internet, someone is posting on Facebook, someone is writing emails, someone is doing research, someone is running the government, etc. In this scenario it is very difficult to ensure security. To ensure security, all our organizations, our universities, our police, our courts, our IT companies, our telecommunication companies, our IT specialists, our students, our teachers, our security experts, etc., everyone is responsible to take part in this process of securing the cyber space. If we include all these entities in this process, only then we can develop a security concept for the cyber space and develop an organized and national agenda for cyber security.

From the political point of view, the Ministry of Communication and Information Technology is the responsible organization for ensuring cyber security. All issues are directed to this organization. But if we realize the huge size of cyber space and consider its complexity, then this issue is out of scope of one organization only. Mr. Marjan once again thanked the Ministry of Higher Education for organizing the discussion of this issue in today's conference.

Dr. Nazir Peroz, Director of the ZiiK at TU Berlin



Dr. Peroz welcomed all participants of the IT conference and expressed his thanks to the MoHE for the good cooperation, to the German Federal Foreign Office and the DAAD for the financial support, and to the German Embassy in Kabul, for the support. He remembered how, in 2013, the team of the ZiiK selected 25 young lecturers from nine Afghan universities to Berlin for participating in a computer science

Master's program. Now, as he said, he is returning them with their Master's degree back to the Minister of Higher Education in order to support their universities and the society.

Dr. Peroz emphasized that since 2002, Afghanistan is on its path into the information age and has already travelled a long way. The nation, the industry and the whole society is making extensive use of modern IT. Today, IT belongs to the national infrastructure, besides roads, water and power supply, and public and professional life would hardly be possible without.

Despite this development, as he went on, the Afghan society and government is under threat of a new form of risks and dangers. Considering the global connectivity, IT security incidents can lead to dropouts and failures, even if their causes are outside Afghanistan. Attacks from hackers and criminals on IT systems are increasing, no matter if they belong to private persons or to large corporations. There are three challenges for the implementation of IT security: Hardware, software and awareness. Digital devices are increasingly used throughout society, and possibilities of remote access bear the risk of a malicious takeover of these devices. Dr. Peroz gave the example of a steering wheel of a car which could potentially be taken over by a hacker who would then be able to steer the car.

On the other hand, Dr. Peroz stated that there is no piece of software which is 100 % secure. Thus, there will always be criminal hackers who aim at finding security holes in software systems. Lastly, a certain security awareness is crucial for all users of IT. Today, as he explained, about 80 % of all IT users worldwide have too little knowledge about the consequences and impacts of security issues within the devices they use.

As this topic is relatively new to Afghanistan, it should be expected that the country is especially vulnerable to such attacks. The interior security of a nation today is inseparable from secure IT structures. Their protection is of outstanding significance to the national security policy. Thus, a "national IT security plan" is to be developed in order to protect IT systems in Afghanistan against global attacks.

This national IT security plan has three strategic goals:

- **Prevention:** Adequate protection of IT structures
- **Intervention:** Act effectively in case of IT security incidents
- **Sustainability:** Strengthening IT security competences in Afghanistan and meeting international standards

At the end of his speech, Dr. Peroz stressed that this year's IT conference with the topic of Cyber Security is targeting all societal, political and academic actors. Focus of this conference are topics like **IT Education and Awareness**, **IT Security Infrastructure** and **Management of IT Security**, which are going to be worked on during three workshops on the following day. The results are going to be discussed on the third conference day.

Keynote speeches

On the first day of the conference, in addition to the opening speeches, two keynote presentations were given on the subject of Cyber Security:

Cyber Security - introduction and overview

Mr. Christopher Nguyen, Lecturer at the Institute of Telecommunication Systems and member of the research group "IT Security" at TU Berlin



Mr. Nguyen gave an introduction to Cyber Security. The presentation highlighted that IT security is a consequence of choices that are made. This was illustrated by the example of bicycle locks: They exist in various forms, different types of locks and different advantages and disadvantages. These include various degrees of resistance against theft, but also the question of how to grant other users access to the bicycle, and no less

importantly how to revoke it again.

Following that, Mr. Nguyen started a discussion on how to prevent unauthorized access to computer systems and data. A good security strategy includes measures that are effective in case of software vulnerabilities, loss or theft of equipment, social engineering and insider attacks.

In his concluding remarks, Mr. Nguyen emphasized that informed and trained staff, timely installation of security updates, and using encryption when storing data on portable equipment are simple but effective measures that can increase the IT security in an organization.

Cyber security and its challenges for Afghanistan

Mr. Ahmad Masood Latif Rai, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



The presentation was about the importance of Cyber Security in the current era of digitalization of information. In the first part of the presentation, Mr. Masood provided some statistics regarding the costs of Cyber Crime in the world which consisted of costs of values being hacked, recovery costs, as well as technical and human resource costs. He then presented a forecasting report of Cyber Security Ventures world-wide and provided an

anticipated overview of the global population, the amount of digital content and the expected number of connected devices in 2022.

In the second part of the presentation, Mr. Masood explained the types of threats in Cyber Security and discussed different types of malicious software (malware) which are composed of adware, spyware, bots, botnets, trojan horses, viruses, logic bombs (time bombs), rootkits, worms, hoaxes and ransomware. He presented some hacking cases in 2016 which were conducted using ransomware which involved the usage of Bitcoin, stressed the importance of mobile security and compared the security threats of iOS, Android, Blackberry OS and Windows Phone.

At the third part of the presentation, Mr. Masood pointed out some current technology trends like Industry 4.0, Cloud Computing, Internet of Things, Internet of Services, Mobile Banking, E-Government, Miniaturization, etc. At the end he proposed the establishment of a National Agency of Information Security Standards which should provide standards for different concepts regarding Information Technology in Afghanistan.

Day 2: December 19th, 2016

The three workshops of the second day were introduced to the participants of the conference. The workshop topics were “**IT Education and Awareness**”, “**IT Security Infrastructure**” and “**Management of IT Security**”.

Workshop: IT Education and Awareness

Moderated by: Mr. Hassan Adelyar, Dean of the Computer Science Faculty at Kabul University

Opening by: Mrs. Zohra Zekeria, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Introduction



Mr. Hassan Adelyar, Dean of Computer Science Faculty at Kabul University, presented the schedule of the workshop to the participants. He stated there were four keynotes in the morning.

The Workshop has been opened by a presentation of Mrs. Zohra Zekeria, lecturer of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, about the topic “Current situation of IT security education and awareness in Afghanistan”.

This was followed Mr. Adelyar introduced Mr. Sohail Mukhtar, lecturer of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University,

as the next speaker. His presentation was about “Measurements to increase IT security awareness in Afghanistan”. As third presenter, Mr. Adelyar introduced Mr. Abdul Rahman Sherzad, lecturer at Computer Science Faculty of Herat University, and Ph.D. student at Technical University of Berlin. Mr Sherzad spoke about “Web application security and awareness”. Last speaker of this workshop was Mr. Shakirullah Waseeb, Lecturer of the Computer Science Faculty at Nangarhar University, who spoke about the “Role of MoHE and the Afghan universities in IT security awareness and education in Afghanistan”.

In the afternoon, concrete measures about the workshop topics and their implementation have been discussed. Altogether, 30 persons participated in this workshop.

Keynotes

Current situation of IT security education and awareness in Afghanistan

Mrs. Zohra Zekeria, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mrs. Zekeria began her presentation by stating that advances in information and communication technologies have revolutionized government, educational and commercial infrastructures. Recently, the Afghanistan Payment System (AFPay), which promotes financial inclusion and building a robust and modern payment system in Afghanistan, has successfully been launched. The operational stability and security of critical information infrastructure are vital for the economic security of the country. Intellectual property of individuals such as reputation,

personal data, bank account details and health information can be hard to replace and are potentially dangerous if a malicious person gets access to it. To alleviate risks resulting from data leakage, it is of paramount importance to have a secure IT system. A data breach can put the reputation at risk and is a very expensive problem to solve. Weaknesses or vulnerabilities allow an attacker to perform acts of cybercrime. The vulnerabilities in IT systems are classified as technical (ex: SQL injection) and organizational (human behavior, social engineering).

The only effective way to mitigate the technical and social engineering threats is through the combination of security policies, security technology, and security awareness. Besides the security policies and technologies, it is very important to raise the awareness of the staff about IT security. Awareness programs train individuals to recognize IT security concerns and respond accordingly.

Afghanistan as a developing nation has partially implemented IT services. Both technical and non-technical staff do not have enough knowledge about security yet. However, some organizations have security professionals but the rest of the staff is not aware of security. They believe that the security of the IT system is just the responsibility of the security specialists. They are not aware that their common mistakes create big problems. For example, it is very usual in Afghanistan to use jail-broken mobile operating systems and unauthorized applications. In offices, the computer systems are often used for personal use and relatives and friends are allowed to have access to the systems. In short, we have a cultural problem when using IT systems.

Afghanistan needs an awareness program to educate staff that security is everyone's responsibility and not just for geeks. A continued security education and awareness is required to be made part of the common culture.

Measurements to increase IT security awareness in Afghanistan

Mr. Sohail Mukhtar, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



In his presentation, Mr. Mukhtar described "measurements to increase IT security awareness (ITSA) in Afghanistan". He discussed objectives, importance and challenges of implementing ITSA. The behavior of employees affects information systems, which can be positive or negative. An IT security awareness program is needed to reduce unpredictable costs. Information technologies are slightly new in Afghanistan and most of the employees are uneducated about IT security issues so far.

In the following, Mr. Mukhtar offered an IT security awareness training program to extend the knowledge level of users about IT security. He also proposed a structure for an ITSA training program starting with the design, training, implementation and post-implementation of ITSA.

Web application security and awareness

Mr. Abdul Rahman Sherzad, Lecturer at the Computer Science Faculty of Herat University, and Ph.D. student at TU Berlin



Mr. Sherzad began his presentation about web application security challenges by mentioning that major security problems were only caused by a collection of smaller issues and ignorance, and only a reverse similar behavior is needed to resolve the given condition.

Secure web programming plus end users' awareness are the last line of defense against attacks targeted at the corporate systems, particularly web applications, in the era of the world-wide web. Mr. Sherzad's presentation was an introduction to web application security threats, in which he demonstrated the security problems that exist in corporate systems with a strong emphasis on secure development. Major security vulnerabilities, secure design and coding best practices when designing and developing web-based applications were covered.

The main objective of the presentation was raising awareness about the problems that might occur in web-application systems, as well as secure coding practices and principles. The presentation's aims were to build security awareness for web applications, to discuss the

threat landscape and the controls users should use during the software development lifecycle, to introduce attack methods, to discuss approaches for discovering security vulnerabilities, and finally to discuss the basics of secure web development techniques and principles.

Most web application attacks occur through Cross Site Scripting (XSS), and SQL Injection. On the other hand, most web application vulnerabilities arise from weak coding with failure to properly validate users' input, and failure to properly sanitize output while displaying the data to the visitors. Literature also confirms the following web application weaknesses in 2010: 26 % improper output handling, 22 % improper input handling, and 15 % insufficient authentication, and others.

Then Mr. Sherzad talked about the vulnerabilities of client-side user's input validation, the concept and risk of phishing, Cross-Site Scripting (a.k.a. XSS) and SQL injection attacks. He clearly and practically demonstrated the risks and dangers of those attacks with real life examples. After explaining the mentioned security threats and vulnerabilities he presented the proper and standard approaches as solution to keep our web applications secure and/or mitigate the risks from those attacks and threats.

As a conclusion, Mr. Sherzad recommended the following factors as the core security principles: use least privilege, do not trust user input, apply defense in depth, turn off un-needed services, keep systems patched, watch for logic holes, hide sensitive information using encryption and access controls methods, and finally increase end users' awareness.

Role of the MoHE and the Afghan universities in IT security awareness and education in Afghanistan

Mr. Shakirullah Waseeb, Lecturer at the Computer Science Faculty at Nangarhar University



In the beginning of his presentation, Mr. Shakirullah emphasized that the Ministry of Higher Education (MoHE) and the Afghan universities play a significant role in the IT security awareness and education, because the MoHE facilitates higher education opportunities throughout Afghanistan as well as abroad. Similarly, Afghan universities present a platform for delivering higher education and, subsequently, for providing professionals to society and the marketplace. Therefore, the MoHE and the Afghan universities can play a vital role in IT security awareness and education.

Most Afghan universities have computer science faculties and therefore employ academic members who are responsible for establishing and including IT security subjects in computer science syllabuses. These subjects should cover theoretical, practical, as well as management aspects of IT security. Therefore, Mr. Shakirullah proposed some subjects, which can be quite effective. These subjects include “IT security fundamentals”; in this subject most of the security terms and concepts can be touched, “Information Security Management”; here

frameworks and standards will be studied in order to manage security risks, policies, team, contingency planning etc., “Software Security Engineering”; considering security in development and maintenance of software, “Security Lab”; a practical approach to security evaluation and mitigation. Similarly, as he went on, there are IT centers at some universities e.g. IT Center Kabul (ITCK), IT Center Nangarhar (ITCN), IT Center Herat (ITCH), IT Center Balkh (ITCB), and IT Center Qandahar (ITCQ). These centers are responsible for organizing security awareness programs for students from different faculties of the university. Likewise, there are IT teams at the universities who are responsible for designating an Information Security Officer; who will handle security related incidents and will continuously arrange security awareness training for administrative personnel.

Mr. Shakirullah suggested that the MoHE should establish a security team which is also responsible for security awareness and education. The security team members have to be provided with trainings abroad in order to bring them to an international level of IT security. Similarly, the security team is responsible for arranging seminars, workshops, and trainings to both MoHE and universities’ employees. This team should be given enough authority and support. Currently, most of the organizations are required to spend money in order to secure their infrastructures. Therefore, MoHE is accountable to allocate a budget for IT security.

Eventually, Mr. Shakirullah summarized that the MoHE and the Afghan universities are very important in raising the security awareness level throughout Afghanistan by education and training.

Discussion: Challenges, proposals and implementation

In the afternoon, all participants of this workshop discussed the issues which have been presented in the keynotes and the topic of “IT Education and Awareness”. The results of this discussion were to be presented and discussed on the third conference day.



Workshop: IT Security Infrastructure

Moderated by: Prof. Mirza Mohammad Mirza, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Opening by: Mr. Said Jawad Saidi, Lecturer at the Computer Education and Information Technology Faculty at the Education University of Shaheed Ustad Rabani in Kabul

Introduction



Prof. Mirza Mohammad Mirza, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, presented the schedule of this workshop to the participants. He explained there were four keynotes in the morning.

The first presentation of the day was from Mr. Said Jawad Saidi, Lecturer of the Computer Education and Information Technology Faculty at Education University of Shaheed Ustad Rabani, about the “Current situation of IT security infrastructure in Afghanistan”. The second presentation came from Mr. Ramin Ahadi, Lecturer of the Computer Education and Information Technology Faculty at Education University of Shaheed Ustad Rabani, and was about a “Mechanism for securing IT infrastructure and services in government organizations in Afghanistan”. The following speech was from Bismillah Hossainy, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, about “Development of a Public Key Infrastructure for secure communication at Afghan authorities”. The last presentation was from Mr. Mohammad Mustafa Naier, Lecturer at the Computer Science Faculty at Balkh University, about “Security concepts for IT infrastructure”

In the afternoon, measures and their implementation have been discussed. Altogether, more than 30 persons participated in the workshop.

Keynotes

Current situation of IT security infrastructure in Afghanistan

Mr. Said Jawad Saidi, Lecturer at the Computer Education and Information Technology Faculty at Education University of Shaheed Ustad Rabani



Mr. Jawad enumerated some of the recent cyber attacks on Internet infrastructures to emphasize the importance of Cyber Security. According to him, the number of data breach incidents has been growing for the past 5 years. Afghanistan would be increasingly modernizing government operations and processes by implementing various projects such as E-Tazkera and E-Government. Increasing the number of online services and information, as he pointed out, widens the potential attack surface. Assessing the current status of IT infrastructure security would be a critical step towards establishing a more secure

infrastructure.

He argued that measuring the security is a challenging task, because of different goals pursued by each organization as well as increasing diversity and complexity of equipment, devices, and applications. Therefore, he outlined a systematic approach to uncover the security status of the IT Infrastructure. The approach starts by categorizing the IT infrastructure. Adequate metrics are important for any measurement system, and finding appropriate metrics for each element of IT infrastructure is not a trivial task. Therefore, he suggested a threat-safeguard approach for determining the security status. This approach, as he explained, collects as many threats as possible to an item in the categorization and checks whether appropriate safeguards are applied. He finished his speech by stating that the status of the safeguards generates enough information for preparing future steps for securing IT infrastructures.

Mechanisms for securing IT infrastructure and services in government organizations in Afghanistan

Mr. Ahmad Ramin Ahadi, Lecturer at the Computer Education and Information Technology Faculty at Education University of Shaheed Ustad Rabani Kabul



In the beginning of his presentation, Mr. Ahadi pointed out that IT infrastructure comprises of physical/technical circumstances (buildings, IT centers, server rooms, cabling, protective cabinets, racks etc), IT systems (computers, servers, network devices, fax machines, mobile telephones and many more), and services (applications running inside the IT systems providing services throughout the network infrastructure) for the clients and users.

According to him, securing this infrastructure requires a high amount of facilities and mechanisms to establish sustainable business processes within the organizations. He went on to discuss issues and mechanisms related to IT security of governmental sectors in Afghanistan. Typical mechanisms which are being recommended by security standards are the following:

- Cryptography
- Authentication
- Access control lists
- Implementation of rules & policies, and
- Availability

Mr. Ahadi explained that securing IT infrastructures is a continuous process organizations should follow based on their Information Security Management System (ISMS). However, as he pointed out, whether organizations in Afghanistan maintain an ISMS or not, is a question which still needs to be investigated. In the end of his speech, he suggested that each organization asks itself the following key questions relating to IT security:

- How secure is the information technology of the organization?
- How carefully is business-relevant information handled?
- Does the organization maintain an ISMS?

Development of a Public Key Infrastructure for secure communication at Afghan authorities

Mr. Bismillah Hossainy, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mr. Hossainy began his presentation by stating that Information security has become crucial due to the evolution and widespread use of Information and Communication Technology. With a new beginning in 2002, as he went on, the IT sector in Afghanistan has also experienced a satisfactory growth. Information interchanges via electronic communications are common amongst government agencies. Similarly, the growth of IT has empowered the Afghan government to move its services online to serve the Afghan citizens better. Although the use of IT is widening in the country day by day, its security aspects have often been forgotten. For government organizations, especially security-related agencies, it is an undeniable requirement to ensure the security of their

information assets. For data security, Public Key Infrastructure (PKI) is a promising technology and has become an ideal solution for securing information systems. However, PKI is not just a technical solution; it rather comprises technology, people, policies, as well as procedures.

Mr. Hossainy proposed a national Government PKI (GPKI) for establishing a secure and reliable communication environment for electronic data transmissions and an eGovernment platform in Afghanistan. This solution includes the architecture, success factors for implementation, as well as the implementation steps. The proposed solution has a hierarchical and scalable architecture to mimic the organizational structures in Afghanistan and support future growth.

Security concepts for IT infrastructure

Mr. Mohammad Mustafa Naier, Lecturer at the Computer Science Faculty at Balkh University



Mr. Naier presented a security concept for IT infrastructures in Afghanistan. He mentioned that a security concept for IT infrastructure should be comprehensive and include all aspects of the infrastructure. In order to preserve a secured infrastructure, it is to be understood as the intersection of people/organizations, technologies, processes and policies.

First, it would be important to convince the top management about the importance of security which enables more investment in this area. Additionally, it should be based on the organization security objective. The security domains for IT infrastructure should

be defined.

He listed the following security domains as relevant for the infrastructure:

- laws, investigation and ethics
- physical security
- access control (i.e. responsibilities of employees)
- security management (i.e. policy development, policy enforcement, standards, risk analyses)
- security architectures
- education, trainings and awareness
- business continuation and disaster recovery plans

The aforementioned security domains, as he finished his presentation, would enable organizations to maintain the intersection that is mentioned for a secure infrastructure.

Discussion: challenges, proposals and implementation

In the afternoon, all participants of this workshop discussed the issues which have been presented in the keynotes and the topic of “IT Security Infrastructure”. The results of this discussion were to be presented and discussed on the third conference day.



Workshop: Management of IT Security

Moderated by: Mrs. Foawziah Nasery, Dean of the Computer Science Faculty at Herat University

Opening by: Mr. Mohammad Zia Sana, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Introduction



Mrs. Foawziah Nasery, Dean of the Computer Science Faculty at Herat University, presented the schedule of this workshop to the participants. She stated there would be four keynotes in the morning.

The first presentation was from Mr. Mohammad Zia Sana, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, about the “Current situation of IT security management in Afghanistan”. As next speaker, Mrs. Nasery introduced Mr. Pazir Ahmad Ahmad, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, who spoke about “Development of IT security policies and guidelines”. The next speaker of the day was Mr. Abdul Ghafar Tavakkoli, Lecturer at the Computer Science Faculty at Herat University, about “IT security and responsibility”. As last presenter, Mrs. Nasery introduced Mr. Abdullah Hamidi, Lecturer at the Computer Science Faculty at Herat University, who spoke about “Securing E-government services in Afghanistan”.

In the afternoon, measures and their implementation were discussed. Altogether, more than 70 persons participated in the workshop.

Keynotes

Current situation of IT security management in Afghanistan

Mr. Mohammad Zia Sana, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



In today's world, as Mr. Sana began his speech, where most organizations, businesses and governments are online and provide online services and on the other hand, online communication becomes a necessity, the likelihood of cyber-attacks increases. Hence, as he concluded, protecting information is necessary, and respectively, information security has become a very important field which is considered as an integral asset for most organizations. In spite of online attacks,

there are attacks against computers in both business and home environments.

Cyber Security attacks, as he explained, have grown world-wide during the past several years. Accordingly, Afghanistan is also suffering from cyber crimes. Mr. Sana referenced a research which demonstrates that the aggregate misfortune resulting from cyber-crimes between 2011 and 2015 amounts to \$ 28 million. The majority of these attacks, 70 %, were reported by staff members at financial organizations.

Mr. Sana complained that information security is considered a marginal topic in Afghanistan and generally broken down into a few technical safeguards like installing firewalls, antivirus software, applying strong passwords, validation of application forms, employment of guards or locking of server rooms. Even though this might secure the outer border of the organization, there still are threats from insiders because many organizations lack appropriate processes, policies and standards for protecting data throughout its lifecycle and most failed to properly train and certify employees.

Therefore, as Mr. Sana concluded, an Information Security Management System (ISMS) is a necessity and increasingly important within organizations to properly protect their information. According to him, ISMS is a systematic, structured and ongoing approach to enclose people, processes and information technology systems that protect information and systems from internal and external threats. In order to protect the information and granted the organization's information security, ISMS should be established, implemented and monitored. Eventually, he considered the top management responsible for running the ISMS as a continuous process.

Development of IT security policies and guidelines

Mr. Pazir Ahmad Ahmad, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mr. Ahmad began his pre-sentation by stating that organizations should have four types of documents to ensure information security: information security policy, standards, procedures and guidelines. The information security policy is needed to ensure that the organization complies with the rules and regulations, and fulfill the security needs of the organization.

He explained that the information security policy is a formal document containing rules and regulations which are released by the top management in order to protect the information assets. It can be supplemented by policy guidelines which specify how to follow the policy; these guidelines are not mandatory but recommended.

Mr. Ahmad further elaborated that the policy development is a continuous process where developers, human resources, audits and other end users in the organization are involved. During the development process, as he explained at the end of his speech, the policy developers should consider the laws and regulations set by the government, as well as business objectives and all possible threat types expected at the organization. A good security policy should be brief, clear and easy to understand.

IT security and responsibility

Mr. Abdul Ghafar Tavakkoli, Lecturer at the Computer Science Faculty at Herat University



First, Mr. Tavakkoli stated that Information Technologies are developing quickly, both the number of users and use cases of the new technologies are growing, and they are becoming an indispensable part of the life of many people around the world. While IT has many benefits, using these technologies bears different risks and dangers, which also increase day by day. Cyber crimes such as trojan horses,

phishing, spyware, adware, and other computer attacks are rapidly growing and evolving everyday with advancement of the new IT services.

Mr. Tavakkoli explained that almost all countries are reacting to such threats by increasing and expanding Cyber Security. This is the responsibility of the government, the private sector and individuals all together. While a collective responsibility, only governments are in the position to lead, create and supervise national Cyber Security efforts. In addition to that, the government has to increase the awareness and understanding of the importance of Cyber Security and clarify the stakeholder's roles and responsibilities.

Also, as Mr. Tavakkoli went on, the contribution of the private sector to the national Cyber Security is essential as private companies own most of the IT infrastructure in many countries. Many of the cyber attacks make use of internal computers which have been compromised because of lack of awareness of the staff. Thus, national Cyber Security must address vulnerabilities of individuals, too. An effective Cyber Security can be achieved when governments determine objectives, explain how to achieve and specify the roles and responsibilities of different parties.

Mr. Tavakkoli closed his speech by stating that cyber crimes can originate from one country and effect another country, which makes Cyber Security borderless and thus there is a need of cooperation on different levels, local, regional and international.

Securing E-government services in Afghanistan

Mr. Abdullah Hamidi, Lecturer at the Computer Science Faculty at Herat University



Mr. Hamidi began his speech by explaining that the use of information and communications technology (IT) is increasing every day. One of the recent trends of using IT in developed and developing countries is eGovernment, which refers to the use of IT by the governments to deliver online governmental services to citizens as well as the industry. Through e-government, as he further elaborated, government services are

available to citizens 24/7, they are more transparent, accessible with lower costs, of higher quality, and more time-efficient. In addition, people would be able to have greater influence on governmental decision-making processes by online voting, by providing their opinions in forums or by contacting governmental organizations directly e.g. via email or contact forms.

Mr. Hamidi emphasized that one of the key challenges in providing eGovernment services is the security of information and the respective services. He stated there are many attackers in the world aiming at information stored in government database systems. Most of the online services provided by the governments are based on web applications. Therefore, attackers try to find vulnerabilities of such web applications and use various ways to access the systems. He stressed that this can result in damages like loss of information, breaches of confidentiality, and problems with availability or integrity which in turn affects the overall eGovernment's performance. As an example, Mr. Hamidi listed several threats for eGovernment services like packet sniffers, DoS attacks, SQL injection, cross-site scripting etc. which have to be known by the software developers as well as the governmental organizations. Besides, related actions have to be taken to overcome those threats and secure eGovernment services.

Therefore, as Mr. Hamidi concluded his presentation, governmental organizations have to have defined security rules and policies, defined roles and responsibilities, and have to use different security tools and applications such as cryptography, firewalls, analyzing and monitoring tools. The aim must be to find vulnerabilities and to resolve them in order to prevent attackers from accessing valuable information stored in governmental online systems.

Discussion: challenges, proposals and implementation

In the afternoon, all participants of this workshop discussed the issues which have been presented in the keynotes and the topic of “Management of IT Security”. The results of this discussion were to be presented and discussed on the third conference day.



Day 3: December 20th, 2016

Moderation: Prof. Osman Babury, Deputy Minister of Higher Education,
Dr. Nazir Peroz, Head of ZiiK at TU Berlin



First, Prof. Babury welcomed all participants to the third conference day and wished all a successful day. Dr. Peroz briefly presented the schedule of this day and stated that the aim of the last conference day was to discuss the results of the three workshops.

The results of the workshop **"IT Education and Awareness"** were presented by Mr. Mohibullah Amin Wardak, Kabul University, of the workshop **"IT Security Infrastructure"** by Mr. Rafiullah Momand, Kabul University, and of the workshop **"IT Security Management"** by Mrs. Mursal Dawodi, Kabul University.

Results of the Workshop: IT Education and Awareness



Mr. Wardak summarized the results of the workshop "IT Education and Awareness". After the key-note presentations, the workshop participants discussed the following topics and proposed possible solutions:

Means to deliver the necessary IT security skills and awareness

As a result of the discussion, the following means for delivering IT security awareness were proposed:

- Training programs and courses
- Seminars and conferences
- Journals (It will help the staff who is unable to attend courses and conferences)
- Bulletin boards
- Posters
- Media coverage
- Daily news websites

Approach for deploying an IT security awareness program at the MoHE

Proposed approach:

- Define domain and scope
 - Who is the target group?
- Define goals
 - What is expected from the staff regarding IT security awareness?
- Selecting awareness topics
 - Web usage, social engineering, mobile device security issues, allowed software on organization systems, access control issues, and many more

Methods for evaluating an IT security awareness program at the MoHE

Proposed methods:

- Written test
- Interview
- Questionnaire
- Survey
- White Hacking (send a test link, and wait for user to click it)
- Online platform for self evaluation

Including IT security subjects in the Bachelor's program of computer science faculties

Proposed subjects:

- Computer Code of Ethics
- Information Security Management
- Security Lab (vulnerabilities exploitation)
- Network Security (network specialization)
- Software Security (software engineering specialization)

Results of the Workshop: IT Security Infrastructure



The summary of the workshop “IT Security Infrastructure” was presented by Mr. Momand. The summary included the conclusion of the workshop’s presentations and the results of the discussions.

All workshop participants agreed that in order to improve the current situation of the IT security infrastructure of Afghanistan, first an analysis of the current situation needs to be performed to identify problems and vulnerabilities. On the basis of the results of this analysis, a security team can develop

security policies with the help of international standards and recommendations. The discussion also focused on the risks, different threats and problems of IT security.

After the discussion, the following possible solutions were proposed:

- Securing IT buildings
- Obtaining secure hardware and network equipment
- Secure configuration of routers, switches and firewalls
- Enforcing security standards for applied software
- Defining responsibilities
- Establishing a national IT security response team

Further questions from the audience were:

- Does the use of IT make our daily activities easier or more difficult? Especially considering the security?
- Do we need a security team or IT specialist for the security of IT systems?
- How to convince the top management to provide a budget and to support the implementation of security policies and mechanisms?

During the following, these questions were discussed.

It was concluded, that IT makes daily activities easy, there are e.g. barcode cards for students’ attendance, and students can be found and managed easily throughout the university.

It was argued that if there is an IT specialist in an organization, it might be sufficient, and no security team would be required in the organization. This was responded by the argument that a security team or department is required, and it should take responsibility for such issues. Furthermore it was added that if an ISMS exists, it just needs to be adopted. However, the problem remains that there is no security officer in the organizations. Therefore, internal IT problems should be first solved and then an ISMS department should be created which takes responsibility of the security of the network and the policy.

There are various methods and techniques to convince the top management. It can be invited to security awareness programs or be given a security related presentation to convince it of the importance of IT security within organizations. In particular, the audience made the following suggestions:

- The government of Afghanistan has to have a dedicated budget for IT security
- Conducting conferences and presentations can convince the government to strongly consider IT security
- The lecturers of computer science and IT centers have to start IT security programs at each university
- All IT centers and IT resources have to be updated frequently for security purposes
- Top-level management has to help security teams
- The government of Afghanistan has to recruit eligible and expert people for the IT security
- The government of Afghanistan has to establish an IT security institution
- The government of Afghanistan has to establish IT security team in each governmental organization
- The government of Afghanistan has to create security policies for both logical and physical security
- The government of Afghanistan has to develop its own national IT security strategy plan.
- IT security subject has to be included in curricula
- In every office and administration the security requirements are different. First, there should be an analysis to identify vulnerabilities, and after that the respective security measures have to be suggested.

Results of the Workshop: IT Security Management



The summary of the workshop “IT Security Management” was presented by Mrs. Dawodi, Lecturer at the Computer Engineering and Informatics Faculty of Kabul Polytechnic University. It included the conclusions of the workshop keynote presentations and the results of the discussions.

Before the discussions, the workshop participants were asked the questions via a questionnaire. They had 10 minutes to answer them and were divided into groups. After 10 minutes

the questionnaires were collected. The questionnaire consisted of the following five questions:

- Why do we need a security policy?
- How to motivate end users to know and follow policy rules?
- Assume a governmental organization that has implemented and developed firewalls, anti-virus software and other safeguards. How can it still be vulnerable to some attacks? How to fix this issue to prevent attacks?
- An employee leaves the organization, but some sensitive data is still on his personal laptop. Who is responsible?
- Why is an information security concept a continuous process?

The groups were working to find answers to these questions, and came to the following conclusion: An IT security policy is required for a sustainable operation of IT infrastructure and for the protection of sensitive and personal data. Respective measures to increase IT security awareness are required in order to make end users understand the requirements and to act accordingly.

In order to provide a comprehensive protection against attacks, a number of measures are required. IT security needs to be understood as a process which needs to be permanently enforced, audited and updated. Furthermore, all involved staff members need to be qualified respectively. An emergency response plan needs to be developed to organize counter-measures in case of an actual attack.

For the lifecycle management of IT equipment, well-defined procedures need to be in place. Before an employee leaves the organization, his private equipment has to be wiped from sensitive data respectively.

IT structures change permanently, and so do IT security requirements. Therefore, a centralized organization needs to coordinate and supervise the implementation of the IT security strategy plan.

Discussion and conclusion



After the presentation of the workshop results, all participants agreed that information technology and the Internet today are important tools for all organizations and have to be protected respectively. Therefore, IT security should be made part of the curricula of all faculties of computer science. Some of the university's and authority's members reported about their poor IT security

situation.

At most organizations, responsibilities are not clearly defined and there are no binding regulations:

- IT experts are missing for issues of IT security and for specific tasks (e.g. planning, acquisition, employment, support) for a sustainable implementation of IT systems
- Qualified personnel for PC workspaces and basic support is often missing
- Work processes are poorly coordinated.
- Analyses about the day-to-day operation are not being performed
- There are often contradictory interests within the organizations which are not compatible with each other.
- There is no central certification authority for the security of the infrastructure, IT systems, the network and for applications.

All participants agreed that the availability and security of IT systems is to be guaranteed and coordinated, which is the task of the government. It was added that it is not only about employing IT within the organizations, but to make IT reliable, available and secure throughout the country. Afghanistan has to develop a national IT strategy plan which defines the framework for the development, employment and management of IT structures. Also, the scope and direction of further activities is to be determined in order to reach long-term goals. Therefore, the following measures are to be implemented:

- Evaluation of the current state of development of the organizations and their resources and skills of the staff
- Determination of gaps between the current IT situation and the defined goals
- Development of a common understanding of
 - how and for which purpose new technologies can provide important contributions for the improvement of processes within the organizations
 - which strategic and operative security measures are currently present and which should be implemented
- Definition of pragmatic and realistic goals which can be reached in a given time-frame and with the available resources
- Definition of clear responsibilities and rules at the organizations
- Development of IT laws and regulations

Furthermore, education and trainings is to be provided for all IT end users in order to increase skills and awareness of IT security related matters. Private universities are to be included in this concept.

In the end Dr. Peroz thanked H.E. Mrs. Rula Ghani, the First Lady of the Islamic Republic of Afghanistan for her opening of the conference. Furthermore he thanked H.E. Prof. Farida Momand, Minister of Higher Education, as well as the presidents of the participating universities for their support. He also thanked the German Federal Foreign Office, the German Embassy in Kabul and the DAAD for their support and funding of the conference. He expressed his gratitude towards to the computer science Master's graduates from TU Berlin, the members of the IT Department of the MoHE and of the IT Competence Center and the team of the ZiiK of TU Berlin for the organization of the conference. At last, the president of Kunar University, Prof. Mir Ahmad Hamed, closed the conference with a prayer.



December 18 – 20, 2017

IT Conference Part XIII in Kabul

Conference topic: Modernizing and Unifying the Management System for IT Services

Day 1: December 18, 2017

Opening and Welcome

Dr. Najibullah Khwaja Omary, Minister of Higher Education Afghanistan



Dr. Omary began his speech by welcoming all distinguished guests and stated that the thirteenth in a series of international conferences on Information Technology at the MoHE represents thirteen years of planning, experiences and activities to strengthen the role of technology in academic institutions. He congratulated all involved organizers and appreciated the efforts of all colleagues. He considered the

results and outcomes of these conferences as very important to the MoHE and expected tangible achievements in the growth and application of technology in the MoHE.

According to the National Higher Education Strategic Plan, as he explained, the use of IT is a well-defined prerequisite for the realization of good governance. Conversation of good governance and promotion of e-government can be started much better from academic institutions than any other places. The creation of creativity centers for the implementation of Information Technology projects is a great initiative, as he stated.

The study of developed countries, as he went on, shows that the creation and strengthening of such centers in the academic institutions has been the basis of the beginning of a technological revolution in all fields.

These centers could help students acquire scientific knowledge and theories beyond what they learn from classrooms and lecturers. He pointed out that the generation of the 1980s and before that in higher education institutions were a generation focusing only on texts, but the generation of the 1990s expects to acquire knowledge tailored to the market demands and beyond theories. In this context, computer science students have successful and tangible experience. Two days ago, as he stated, students from computer science faculties presented their inventions and achievements, and the MoHE welcomed these initiatives and the creativity of these young students, and it is committed to the creation of a healthy competitive environment.

Until now, as Dr. Omary pointed out, creative centers have been established only at bigger universities, and the MoHE is determined to extend these centers to other universities as well. According to him, these centers give students of all disciplines the opportunity to think, discover, and invent. Programs such as training of software and hardware skills, employment

methods, foreign language training, advice on academic affairs and class projects along with the support of Information Technology should be the foundations and agenda of these centers.

Dr. Omary continued to explain that despite the large amount of activities and investments, the application of technology at the MoHE is still at its elementary level. This situation indicates that the implementation of Afghanistan's Higher Education Management Information System (HEMIS) has not yet been implemented at other universities beyond the ones in the capital. Still the storage and processing information in the administrative and scientific sections are very simple and basic. With consideration of the described situation at the MoHE, he suggested to the conference conductors to consider the following aspects seriously:

Coordination between hardware and software management: He expected donor partners of the MoHE, IT projects and all IT partners and colleagues to plan and design all projects from now on by carefully studying both hardware and software components in higher education institutions. Designing and installing modern software without studying the hardware capacity, as Dr. Omary stressed, has always been a failure and causing a waste of time and resources.

Alignment of updating processes between the capital and the provinces: Since the MoHE is responsible for the supervision and organization of educational services at the level of all academic institutions; therefore, the application of technology and its updating between the center and secondary units of this ministry should be integrated and coordinated together.

Capacity building for ICT staff: Increasing the capacity knowledge of ICT staff is a fundamental principle in the development of modern technology, as Dr. Omary stressed. Good designs will find the ability to execute, the time when the human capacity is available to implement it.

In the end of his speech, he emphasized once again that, according to its title and agenda, the 13th conference on IT should provide applicable solutions for the modernization and management of the MoHE with technology. Once again, he asked the Head of the IT Department of the MoHE to share the results of this conference and the proposals presented at this conference with all aspects with the MoHE leadership. He wished all the supporters and organizers of this program much success.

Shahzad Aryobee, Minister of Communications and Information
Technology of Afghanistan



Mr. Aryobee welcomed all distinguished guests and stated that it is an honor to be part of this conference which has gathered many professionals of the IT sector of Afghanistan. Information Technologies is transforming our lives faster than ever. It is influencing every aspect of our work and living. Government and businesses, entertainment, communications, security, health care and education – all are being affected by the changes.

He emphasized that more and more countries around the world adopt e-government practices in order to deliver public services efficiently. In Afghanistan, as he continued, a new agency is to be set up as a one-stop shop where all services are provided to citizens under one roof.

More and more universities and educational institutions worldwide, as Mr. Aryobee explained, are offering e-learning opportunities and the number of people subscribing for online-education is increasing at a rapid pace. According to projections, the e-learning market worldwide is going to surpass 243 billion USD by 2022. He stressed that the role of IT in education is increasing, and it is not only the way the lessons are taught which is changing, it is also how the education and universities are managed. Nowadays, missing a class is not a nightmare as it used to be, as students can access class materials online and interact with their peers using more robust communication than ever before.

The mission of the Ministry of Communications and IT (MoCIT), as he emphasized, is to promote connectivity, encourage competitiveness and drive innovation, as well as to ensure that people have access to well-functioning, safe and reasonably priced communications networks.

He approved that without connectivity, markets will not grow and education modernization and innovation will not come to Afghanistan. With this in mind, the MoCIT is working hard to improve connectivity, through the recently agreed upon Digital CASA project. He explained that this project will help the country to get significant support from the World Bank to further enhance the OFC network. With this project, most education institutions' connectivity will be supported by fiber-optic high speed internet.

During the next coming years, as he went on, the MoCIT is looking at building a fiber optic channel in the Wakhan region, to connect China with Central Asia, Africa and Europe. All this will contribute to Afghanistan becoming a digital hub in the region. Afghanistan already has a fiber network of about 5.000 km. During the next few years, he expected that another 1.000 km of fiber to be laid.

Mr. Aryobee continued to explain that all these projects require proper management of IT systems. Together with the MoHE a curriculum for the BA degree in "E-government" has been finalized. Within the framework of this project, 120 professors will be trained to teach the course at the universities of Afghanistan.

He stressed that the MCIT together with the MoHE will start another new project called “Digital Library”, within which, during the next 2 years, 150.000 books will be digitized.

He confirmed that it is his aim to facilitate the creation of resources in our native languages so that with increased connectivity, people living in the provinces can get access to knowledge and information wherever they are.

He also promised to attempt to reform the ICT Institute, build partnerships and strengthen its capacity to prepare the next leaders of IT industry of Afghanistan.

Mr. Aryobee closed his speech by stating that education is a key to all these ambitious goals, and that the MCIT is committed to contribute to achieve these goals and to go beyond.

Dr. Nazir Peroz, Director of the ZiK at TU Berlin



Dr. Peroz welcomed all participants of the IT conference and expressed his thanks to the MoHE for the good cooperation, to the German Federal Foreign Office and the DAAD for the financial support, and to the German Embassy in Kabul, for the support.

Dr. Peroz explained that a modern administration today is not possible without Information and Communication Technology (IT). Even in the Afghan administration there are hardly any processes running completely without support by IT. This allows for an enormous acceleration of administrative processes on the one hand, and on the other provides completely new services and an outstanding quality, transparency and citizen-friendliness.

The pressure on today’s IT departments of the institutions, as he went on, is constantly rising due to increasingly scarce resources (qualified IT personnel, IT services, IT equipment) and a growing number of tasks. Especially IT security aspects play an important role. This requires a strong management system, stable power supply, quality-assured software and updates to fix vulnerabilities.

Dr. Peroz stated that the goal of this three-day conference was to discuss aspects of modernizing and unifying the management for IT Services with representatives of the Afghan government, authorities, universities as well as international guests.

Dr. Peroz closed his speech by wishing all participants much success and good results during the conference workshops.

Building a management structure

Abdul Rahman Sherzad, Lecturer at the Computer Science Faculty of Heart University and PhD Student at TU Berlin



Mr. Sherzad began his presentation by emphasizing the value and importance of data in organizations. It is quickly becoming one of the most important resources for any country, company or organization. Data-driven technologies like Knowledge Discovery from Data (KDD), Data Mining, Data Science and Big Data are shaping our present and will become only more important in the future. It is the data that enables

organizations to explain the past and predict the future through data science and business intelligence tools.

To demonstrate how data can be used as a resource in the context of Afghanistan, he gave the example of the Kankor data. Kankor is the national university entrance exam and since 2003, around 1.7 million eligible high school graduates have attended it. Their first names, last names, father's and grandfather's names are all recorded in a database.

Mr. Sherzad illustrated how this data can be used by giving a couple of practical examples and applications. One could for example autofill missing gender values in the data using identical names, audit and match high school data with Kankor data, use the dataset as a basis for fake default data or use Named Entity Recognition (NER) to recognize People, High Schools, Provinces or Districts.

Mr. Sherzad concluded that there are interesting opportunities for the application of educational data mining in Afghanistan. It could for example predict suitable fields of study for high school graduates, help policy makers in shaping the education system or allow an early warning systems to identify university students who are at high risk of attrition.

Awarding ceremony of the exhibition of IT projects from computer science faculties of Afghan universities



Second day: Tuesday, December 19th, 2017

Three workshops of the second day were of the conference: “**IT Education and Awareness**”, “**IT Security Infrastructure**” and “**Management of IT Security**”. Mr. Sediqi asked all participants to decide in which workshop they would like to participate.

Workshop: Management of e-Services

Moderated by: Mr. Hassan Adelyar, Dean of the Computer Science Faculty at Kabul University

Opening by: Shakirullah Waseeb, Assist. Professor at Faculty of Computer Science, Nangarhar University

Introduction



Dr. Hassan Adelyar, Dean of Computer Science Faculty at Kabul University, pre-sented the schedule of the workshop to the participants. He stated there were four keynotes in the morning.

The workshop has been opened by a presentation of Mr. Shakirullah Waseeb, Assist. Professor at Faculty of Computer Science, Nangarhar University, about the topic “Current situation of Management of e-Services”. This was followed by Mr. Ahmad Masood Latif Rai, Assist. Professor at Kabul Poly-technic University. His presentation was about the “Fourth Industrial Revolution”. As third presenter, Dr. Adelyar introduced Mr. Rafiullah Momand, Assist. Professor at Faculty of Computer Science, Kabul University. Mr. Momand spoke about “Management of Big Data”. Last speaker of this workshop was Dr. Adelyar himself, who spoke about “Management in e-Government”.

In the afternoon, concrete measures about the workshop topics and their implementation had been discussed. Altogether, 30 persons participated in this workshop.

Keynotes

Management of e-Services: Shakirullah Waseeb, Assist. Professor at Faculty of Computer Science, Nangarhar University



With rapid advancement in technologies, Afghan society demands for services that can be delivered electronically. Such e-services require proper management in order to achieve a high quality. Mr. Waseeb based his research on the iterative Plan, Do, Check, and Act (PDCA) approach.

The first major step towards e-government was taken in 2011 with a strategy for the implementation of e-government in Afghanistan. Strengths, Weakness, Opportunities, and

Challenges for e-government in Afghanistan were specified by conducting assessments, workshops, and trainings. Subsequently a strategic framework for e-government development in Afghanistan was published. It is composed of five components: Strategic Principals, E-Government Vision, Strategic Goals, Strategic Directions and Actions Lines, and Strategic Implementation Mechanisms.

Currently the Ministry of Communication and Information Technology (MCIT) is working on the implementation of the EGOV.AF project. Some of the components are already implemented and some are under the way, and some are just planned. These components include National ID Cards, E-Governance Resource Center, Websites for Service Delivery and Interoperability, Automated National Registries (Asan Khedmat), Establishing an ICT village, Developing Electronic Government Applications, and Improving ICT training and ICT literacy.

Mr. Waseeb concluded that e-services are underway in the country and it can be expected that the public will be served with these services soon, adding transparency, efficiency and reliability to government services. There are still problems as well: a lack of public experience and awareness regarding the use of such services, delivery of such services in rural areas, corruption in administrations, lack of technical professionals, weak management and budget issues all complicate the matter. There is hope, however, that these challenges can be overcome soon.

Fourth Industrial Revolution

Ahmad Masood Latif Rai, Assist. Professor at Kabul Polytechnic University and Head of Cyber Security Group at ITCC Afghanistan



Mr. Latif Rai's presentation introduced the idea of the fourth industrial revolution or Industry 4.0 which is understood as the rise of cyber physical systems (CPS). The basic building blocks of these CPSs are the objects (things) which are connected over the internet known as Internet of Things (IoT). These CPSs are interconnected with each other forming a network of Smart Factories. These smart factories are able to provide certain

services over the internet which are often figured as Internet of Services (IoS). The enormous amount of data generated by this 4th industrial revolution gives rise to the concept of Internet of Data. Similarly a large amount of people who are interconnected with these systems and services comprise the Internet of People.

After discussing the key terminologies of fourth industrial revolution environment, advantages of Industry 4.0 were discussed along with the challenges and difficulties that are hindering its adoption. In the end the problems specific to the situation of Afghanistan were discussed, concluding that it is currently very difficult for Afghanistan to take part in this fourth industrial revolution. While the technologies use in the Industry 4.0 paradigm are already in use today, standardization and interconnection of these technologies towards robust system architectures and business models remains a major challenge.

Management of Big Data

Rafiullah Momand, Assist. Professor at Faculty of Computer Science, Kabul University and Head of IT Center - Kabul (ITCK)



In the beginning of his speech, Mr. Momand explained that every two days, we create as much information as we did from the beginning of time until 2003. To store, analyze, and gain in-sight from this huge amount of data (a.k.a Big Data) the traditional architecture needs to be changed. He then discussed how to cope with this challenge and started by defining Big Data using the three V's: Volume, Velocity, and Variety. He continued by discussing two available

architectures of scalability –scale up and scale out –to handle big data.

To ease the distributed programming and store data redundantly he talked about the Map-Reduce Framework. In addition to providing data redundancy, a simple programming model and automatic fault tolerance it also moves computation to data that re-moves the latency caused by data transfer. Finally, he concluded the presentation by discussing machine learning to cope with the bottleneck of software engineers by enabling computers to program themselves.

Management in e-Government

Dr. Sayed Hassan Adelyar, Dean of Faculty of Computer Science, Kabul University



Many countries around the world developed and implemented e-government based on the best practices of developed countries, as Dr. Adelyar began his speech. The experiences from these countries show that for a successful implementation of e-government the local context and conditions of a specific country must be considered.

Dr. Adelyar explained that for implementing e-government in Afghanistan, one needs to find countries that have similar conditions to Afghanistan. However, the complexity of the task is that it is difficult to find countries with the same situation in all aspects. Therefore, Dr. Adelyar's re-search focused on identifying the factors which affect e-government development and identify criteria for these factors to find similar countries. To accomplish this goal he reviewed the existing literature for these factors and criteria. This literature review based on articles and international reports in the domain of national development, governance, ICT development, and e-government. Dr. Adelyar concluded that there are seven main categories of factors which affect e-government development and implementation. These factors are: Geography, Economy, Culture, Human Development, Governance, ICT, and Stability.

Discussion: Challenges, proposals and implementation

In the afternoon, all participants of this workshop discussed the issues which have been presented in the keynotes and the topic of “Management of e-Services”. The results of this discussion were presented and discussed on the third conference day.



Workshop: Management structures for IT security

Moderated by: Prof. Mirza Mohammad Mirza, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Opening by: Mohammad Mustafa Naier, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Introduction



Mr. Mirza, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, presented the schedule of this workshop to the participants. He explained there were four keynotes in the morning.

The first presentation of the day was from Mr. Mohammad Mustafa Naier, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, about the “Current Situation of Network and Internet Policy”. The second presentation came from Ms. Zohra Zekeria, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University and was about a “Results of IT Security Analysis”. The following speech was from Mr. Said Jawad Saidi, Assist. Professor at Faculty of Computer Education and Information Technology, Education University of Shaheed Ustad Rabani and PhD Student at TU Berlin, about “Developing a Security Action Plan”. The last presentation was from Mr. Niaz Mohammed Ramaki, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University and IT Manager at the ITCC Afghanistan, about “Botnets and their Mitigation” In the afternoon, measures and their implementation were discussed.

In the afternoon, measures and their implementation were discussed. Altogether, more than 25 persons participated in this workshop.

Keynotes

Current Situation of Network and Internet Policy

Mohammad Mustafa Naier, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mr. Naier opened his presentation with the remark, that IT Security has become a major concern in Afghanistan. The first step to understand the threats and challenges facing the country in this area is the analysis of the current situation of the network and internet usage policy. The goal of Mr. Naier's research is to analyze the policies of eleven Afghan ministries. Up to now, three ministries have been surveyed

based on the Threat-Safeguard Approach. One of the central results of this research has been that these ministries are expecting the MCIT to enforce policies related to IT Security. Therefore, it is necessary to check and analyze the MCIT's policies and regulation. According to the NCSA of MCIT however, the policies and laws are still being drafted. Additionally, their implementation status is unknown since December 2014. As a result, the security policy, its enforcement and awareness about it is seriously lacking in Afghan ministries.

Results of IT Security Analysis

Zohra Zekeria, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Ms. Zekeria continued with an analysis of the IT security situation at three Afghan ministries: the Ministry of Energy and Water (MoWE), the Ministry of Women Affairs (MoWA), and the Ministry of Counter Narcotics (MoCN).

The checklist for the survey consisted of six different sections: Common Aspects, Infrastructure, IT Systems, Network, Application Security, and Application Development Security. She then

presented the current situation of the three ministries based on these sections and elaborated on the implementation of basic security safeguards in the ministry of Women's affairs.

The results of the IT security check and conversations with the heads of IT at the ministries showed that the IT security situation throughout Afghanistan is insufficient and inadequate. This is mainly due to inadequate organizational structures, lack of qualified IT personnel, the absence of solid IT infrastructures, vulnerabilities in IT systems (hardware and software),

communication and networks, lack of Emergency planning, and lack of Nation-wide IT security policies.

Ms. Zekeria concluded that a National IT Security Strategy Plan for Afghanistan is necessary to establish and maintain an appropriate IT security level. Moreover, effective, secure, consistent and sustainable IT structures can only be achieved through the establishment of strong management structures. A solid management structure helps to mitigate risks for IT and cyberspace, protect governmental and institutional networks, and maintain a trustworthy operation of the IT supply of the country.

Developing Security Action Plan

Said Jawad Saidi, Assist. Professor at Faculty of Computer Education and Information Technology, Education University of Shaheed Ustad Rabani and PhD Student at TU Berlin



Mr. Saidi opened his talk with the observation that the increasing internet penetration and an up-tick in electronic services provided by the government makes the challenging task of securing information in the Afghan government offices more and more important. Information Security is not just about the technical aspects. Indeed, in order to have a sustainable information security, an organization needs an Information Security Management System

(ISMS). Establishing an ISMS requires various interactions with the organization administration. A critical success factor for an ISMS is a visible support and commitment from the leadership. The top management should take the initiative for information security process and realize that they are responsible in general for information security. Besides that, they provide funding, resources and act as a role model when it comes to information security.

Destruction Botnets and Mitigation

Niaz Mohammed Ramaki, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University and IT Manager at the ITCC Afghanistan



Mr. Ramaki began his presentation by sketching the rising threat of cyber crime. His presentation focused on a central tool in the arsenal of online criminals: the botnet. A botnet is a network of interconnected malware that is installed on devices without their owner's knowledge and used to run distributed Denial-of-Service (DDoS) attacks. Attackers ensure their invisibility by exploiting vulnerable computing systems connected to the

Internet and use that system as a foothold while launching malicious activities on other systems.

The infected systems –i.e. bots –receive commands indirectly from attackers via command and control (C&C) servers. He emphasized that this topic is becoming more urgent with the trend of the Internet of Things (IoT). Poorly secured IoT devices are not only easily attacked and brought down, but can become part of a botnet as well. In 2016, the so-called Mirai bot malware took control of poorly protected IoT devices such as wireless routers and security cameras to launch DDoS attacks on prominent websites making them unavailable for several hours. The mirai bot also targeted some Russian Banks with almost 24,000 infected computers around the world. Mr. Ramaki concluded his talk by talking about different empirical and analytical approaches researcher have been using to mitigate the destructive power of botnets.

Discussion: challenges, proposals and implementation

In the afternoon, all participants of this workshop discussed the issues which have been presented in the keynotes as well as the topic of “**Management structures for IT security**”. The results of this discussion were presented and discussed on the third conference day.



Workshop: IT Projects Management

Moderated by: Mr. Ashuqullah Alizai, Acting Dean of the Computer Science Faculty at Herat University

Opening by: Mr. Mohammad Zia Sana, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Introduction



Mr. Ashuqullah Alizai, Acting Dean of the Computer Science Faculty at Herat University, presented the schedule of this workshop to the participants. He stated there would be four keynotes in the morning.

The first presentation was from Mr. Mohammad Zia Sana, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, about the “Current situation of IT Projects Management in Afghanistan”. As next speaker, Mr. Hamidullah Sokout, Assist. Professor of the Computer Engineering and

Informatics Faculty at Kabul Polytechnic University, who spoke about “ICT4D: Utilization of In-formation and Communication Technology (ICT) for achieving sustainable development in the developing countries, particularly in Afghanistan”. The next speaker of the day was Dr. Ahmad Javed Baktash, Assist. Professor of the Computer Science Faculty at Kabul University, about “Critical Failure Factors of IT Projects: Afghanistan Perspective”. As last presenter, Mr. Ghezal Ahmad Zia, Assist. Professor of the Computer Science Faculty at Kabul University and PhD Student at TU Berlin, spoke about “Higher Education Management Information System (HEMIS)”.

In the afternoon, possible measures and their implementation were discussed. Alto-gether, more than 25 persons participated in this workshop.

Keynotes

Current situation of IT Projects Management in Afghanistan

Mr. Mohammad Zia Sana, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mr. Zia Sana explained how IT project management involves a structured approach to managing, organizing, and controlling information technology projects. As the complexity and importance of IT projects have evolved dramatically, thus a successful project that over-comes the numerous challenges like project scope, ineffective planning and unclear expectations, needs to use modern project management techniques for IT projects.

The number of IT projects in Afghanistan is steadily increasing, including complex projects like electronic ID and e-passport. While those projects have already begun, they are facing many problems due to project management failures.

The most common IT project management challenges in Afghanistan include IT managers without technical expertise, not using standard approaches, focusing on the solution rather than problems, duplicate projects, miscommunication inside the team, un-skilled employees, non-existing IT culture and awareness.

Mr. Zia Sana concluded that an iterative and adaptive project management approach fits the current situation in Afghanistan best, where the scope is changing rapidly and user expectation is unclear. Furthermore, a comprehensive and tailor-made IT management policy is required on the government level including an organization that manages and supervises all IT projects.

ICT4D: Utilization of Information and Communication Technology (ICT) for achieving sustainable development in the developing countries, particularly in Afghanistan

Hamidullah Sokout, Assist. Professor of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mr. Sokout recounted the history of successful and unsuccessful IT projects in Afghanistan since 2001, emphasizing that many of those failed due to cultural, social, political and many other factors. A lack of enough educated people as well as knowledge on the essential models and frameworks are a hurdle for the success of such projects in developing countries.

This in turn impacts the economic development, social development and nation building process. Mr. Sokouts research focuses on better understanding ICT projects for development and understanding which factors contribute and which are detrimental to their success. Furthermore he seeks to develop appropriate solutions and specific recommendations including models and frameworks for ICT projects. He concluded his presentation with the suggestion that the concept of Information Communication Technology for Development (ICT4D), which is still new in Afghanistan, should be added to the universities' curriculum. In this way, knowledge about how ICT interacts with society, the challenges and possible solutions can be disseminated, hopefully leading to more successful IT projects in the future. Current situation of Information Technology Project Management in Afghanistan.

Critical Failure Factors of IT Projects: Afghanistan Perspective

Dr. Ahmad Javed Baktash, Assist. Professor of the Computer Science Faculty at Kabul University



The increasing demand for having IT-based systems in Afghanistan has led to a high number of IT projects. Dr. Baktash presented his research into the reasons why many of those are failing.

According to his studies the most important factors of IT project failures in Afghanistan are corruption, poor planning and political interferences. But also failures in project management like unclear goals and objectives, objectives changing during the project implementation and unrealistic time or resource estimates. The sustained progress of projects is hampered by frequent change in government, failure to communicate and act as a team and inappropriate skills of the team members. Dr. Baktash also mentioned stakeholder conflicts, lack of executive support and user involvement, delays in payment and a lack of continuity and monitoring.

His research examines some common factors to these problems stemming from project management, project team competencies, government support, and communication management.

The presentation concluded with recommendations how to cope with the existing challenges to IT projects in Afghanistan.

Higher Education Management Information System (HEMIS)

Ghezal Ahmad Zia, Assist. Professor of the Computer Science Faculty at Kabul University and PhD Student at TU Berlin



Mr. Zia started his presentation based on a concept that he had presented on the 11th IT conference, and which is about a module-based distributed HEMIS for MoHE that is expandable, flexible and usable at low cost (Open Source technologies). The concept was accepted by the workshop members.

Mr. Zia started his work at the ITCC Afghanistan in Feb 2016 as IT manager, where he and 21 students from Kabul University developed 11 modules of HEMIS.

Today at this conference, he wanted to discuss the reasons why HEMIS is not implemented yet, and thus contribute to the workshop topic of "Why IT projects fail in Afghanistan".

At the beginning, he explained that developing of HEMIS was a dream, and that for 10 years already, MoHE did not succeed yet to establish a stable MIS to automate the processes and generate timely report. This is mostly due to the fact that too many donors try to get involved in this topic and thus create chaos.

Mr. Zia explained that on the 11th IT conference in 2015, two major IT projects were discussed: HEMIS and AfgREN, and it was decided that these should be developed.

In January 2016, as he went on, the ITCC Afghanistan started development work for these two projects. Agile methodologies were used, and a close collaboration with various departments of MoHE was established. He stated that there were a number of difficulties, like how to collect all the requirements from the different MoHE departments. Also, there were challenges in using of the new technologies and the framework (PHP Laravel).

Discussion: challenges, proposals and implementation

In the afternoon, all participants of this workshop discussed the issues which have been presented in the keynotes and the topic of **“IT Projects Management”**. The results of this discussion were presented and discussed on the third conference day.



Third day: Tuesday, December 20th, 2016

Moderation: Prof. Abdul Tawab Balakarzai, Deputy Minister of Higher Education, Afghanistan,
Prof. Dr. Mahjoor, Deputy Minister of Higher Education, Afghanistan,
Shukria Jamal, Director of the IT Department of the MoHE,
Dr. Nazir Peroz, Director of the ZiiK at TU Berlin and Director of the ITCC Afghanistan



First, Prof. Balakarzai welcomed all participants to the third conference day and wished all a successful day. Prof. Dr. Mahjoor briefly presented the schedule of this day and stated that the aim of the last conference day was to discuss the results of the three workshops. The results of the workshop "**Management of e-Services**" were presented by Mr. Rafiullah Momand, Kabul

University, of the workshop "**Management structures for IT security**" by Mrs. Zohra Zekeria, Kabul Poltechnic University, and of the workshop "**IT Projects Management**" by Mr. Bismillah Hussainy, Kabul Polytechnic University.



**Presentation of the results of the IT conference to H.E. Dr. Ghani:
Summary of third day (20th December, 2017)**



Upon invitation of H.E. President Dr. Ghani, the participants of the 13th IT conference presented the conference results at the ARG Palace on December 20th. Among the participants of this event were H.E. the First Lady of Afghanistan, Presidents of the Afghan universities, deans of computer science faculties, lecturers, representatives of the MoHE and MoCIT, students from Afghan universities and representatives from the ITCC Afghanistan. First, Dr. Khwaja Omary, Minister of Higher Education, thanked H.E. Dr. Ghani for the invitation. He reported about the opening of the exhibition of student's IT projects on December 16th. 26 IT projects from eight universities were presented in this exhibition, and the five best projects were selected by a jury to receive a prize. He continued with a brief report about the three days of the IT conference at the MoHE and expressed his gratitude for the honor of presenting the conference results to H.E.



In the following, Dr. Peroz spoke about the results of the IT conference Afghanistan and thanked H.E. Mrs. Rula Ghani, First Lady of the Islamic Republic of Afghanistan for opening the second IT exhibition on December 16th.



A comprehensive summary about the conference will be provided by Mr. Latif Rai. Dr. Peroz stated that for a more effective and modern ad-ministration, reliable management structures are required. He again thanked H.E. for his support in this area. Mr. Ahmad Masood Latif Rai presented the overall summary of

the three workshops on the third day of the 13thIT Conference with the topics of "Management of e-Services", "Management structures for IT security", and "IT Projects Management". He pointed out the challenges and problems which were discussed in the workshops and then highlighted the out-come and results of the conference. In the following, the results of these workshops will be presented:

Workshop: Management of e-Services

Mr. Latif Rai reported that there were four presentations in the first workshop which were regarding the “Management of e-Services”. In the first presentation, Mr. Shakirullah Waseeb presented the current situation of Management of e-services in Afghanistan by pointing out the problems in implementation of e-Tazkira, AsanVisa, AsanPassport, AsanJawaz and AsanERP. He provided some historical background of these services and gave statistical figures as well. Mr. Latif Rai then presented the summary of the second presentation, which was regarding the “Fourth Industrial Revolution”. In his presentation Mr. Latif Rai mentioned the key terminologies of Cyber Physical Systems(CPS), Internet of Things (IoT), Inter-net of Services (IoS), Internet of Data (IoD), Internet of People (IoP), Smart Factories, Cloud Computing and the relationships among them in the new industrial revolution. He clarified that the enormous amount of data produced as a result of these components gives rise to the concept of Big Data. Mr. Latif Rai then summarized the third presentation which was “Management of Big Data” presented by Mr. Rafiullah Momand. He mentioned the 3V characteristics of Big data which are Velocity, Volume and Variety. He then mentioned the concept of Map-Reduce and machine learning techniques which are used in processing and management of Big data. He then summarized the last presentation in the workshop which was “Management in e-Government” presented by Mr. Said Hassan Adelyar. He pointed out the effective ways for government for providing e-services to facilitate their administration and improve their services by usage of ICT. He focused on seven categories of factors and aspects, which is notably effective in the development of e-government: geographical aspects, economic aspects, cultural and social aspects, the human development factor, governance factor, ICT factors and stability. These factors should be kept in mind while introducing and bringing an e-service from another country, because only services from countries which are similar in regard to these factors can be adapted successfully.

Workshop: Management structures for IT security

Mr. Latif Rai summarized the second workshop which was about the “Managements for IT Services”. There were four presentations in the workshop. The first workshop was regarding the “Current Situation of Network and Internet Policy in Afghanistan” presented by Mr. Mohammad Mustafa Naier. He provided some statistics regarding the number of internet users in Afghanistan and highlighted the network and internet usage policies developed by MCIT. He further highlighted that in the second presentation, Ms. Zohra Zekeria presented the “Result of IT Security Analysis” which was conducted by the security group of ITCC in 2017. The group analyzed the Ministry of Women Affairs, Ministry of Counter Narcotics and Ministry of Energy and Water. He explained the findings and statistics which were revealed in the analysis and the current situation of IT projects in these ministries. Mr. Latif Rai then summarized the third presentation which was presented by Mr. Said Jawad Saidi which was regarding the “Role of Organization Administration in Information Security”. He focused on the role of top level management in adoption of information security in an organization. He also mentioned the importance of budget allocation for information security within an organization.

He then summarized the last presentation of the workshop entitled “Destructive Botnets and their Mitigation” which was presented by Mr. Niaz Mohammad Ramaki. He presented the types and categories of botnets and explained the security issues linked with botnets. He

provided some statistics regarding the harms caused by them and further proposed the development of an email security gateway and an Afghan Internet Exchange Point for checking the internet traffic.

Workshop: IT Projects Management

Mr. Latif Rai then summarized the last workshop which was entitled as “IT Projects Management”. In this workshop there were four presentations, first of which was regarding the “Current Situation of IT Projects Management in Afghanistan” presented by Mr. Mohammad Zia Sana. In this presentation, some of the key projects of Afghanistan were enumerated and the reasons why they were not successfully implemented. The major projects which were outlined, were e-Tazkira, e-Government Resource Center, Websites for Service Delivery and Interoperability, Automated National Registries, Asan Khidmat, establishing an ICT Village in Afghanistan, developing Electronic Government Applications and improving ICT training and ICT literacy. He further provided some statistics regarding these projects and pinpointed the key management issues which had caused problems in the way of successful completion of these projects. Mr. Masood then summarized the second presentation of the workshop which was regarding the “Information and Communication Technology for Development (ICT4D)” presented by Mr. Hamidullah Sokout. He presented the ways of utilization of Information and Communication Technology (ICT) for achieving sustainable development in the developing countries, particularly in Afghanistan. The techniques discussed in the presentation cause different innovations in the world, and effectively remove the corruption, decrease organizational bureaucracy, minimize the cost for huge investments and accelerate the routine activities. He further explained how the concept of ICT4D is completely new in Afghanistan; and its addition in universities’ curriculum will help the recognition of ICT in different aspects of human life as knowing the challenges and solutions with the help of models and frameworks could be a pathway for the implementation and realization of such projects. Then he summarized the third presentation which was regarding the “Critical Failure Factors of IT Projects in Afghanistan” presented by Dr. Jawid Ahmad Baktash. He presented some of the main factors and reasons of projects failure as corruption, poor planning, political interferences, unclear goals and objectives, objectives changing during the project implementation, unrealistic time or resource estimates, change in government, failure to communicate and act as a team, inappropriate skills, requirements changed and were not finalized, poor user input, stakeholder conflicts, hidden costs of going, lack of executive support and user involvement, delays in payment, lack of continuity and monitoring. At the end, he proposed some solutions which should be considered while dealing with projects management. Then Mr. Latif Rai summarized the last presentation of third workshop which was regarding the “Higher Education Management Information System (HEMIS)” presented by Mr. Ghezal Ahmad Zia. In his presentation he presented the modules of HEMIS that were developed and the reasons why it could not be successfully implemented. He further mentioned the duplication of tasks which were done during the development of different modules of HEMIS and how it caused problems in the way of its implementation.

Findings of discussion sessions: After presenting the summary of workshops, Mr. Ahmad Masood Latif Rai mentioned some problems which were talked about in the discussion session of workshops. These problems are:

- Lack of IT Personnel in organizations

- Lack of sufficient budget allocation for IT Projects
- Weak Project Management Skills
- Lack of IT Policies and standards
- Lack of a monitoring body for supervision of IT Projects
- Inefficient cooperation, communication and coordination among different sections within organizations
- Implementation of e-services from other countries in Afghanistan without analyzing the factors which can negatively affect these projects
- Inefficient implementation of Open Access Policy in Afghanistan
- Lack of an internet Traffic Monitoring agency in Afghanistan
- Lack of a National IT Security Strategy Plan for Afghanistan
- Lack of awareness and training programs for IT personnel in organizations
- Inefficient motivation and dedication for securing the IT infrastructure in organizations
- Poor project planning and unrealistic cost estimation techniques
- Unnecessary bureaucracy within different business processes
- Corruption
- Inefficient control of MCIT in IT Projects monitoring and evaluation
- Lack of knowledge of essential and secure models and frameworks

Speech of H.E. State President Dr. Ghani



After presenting these factors, H.E. President Dr. Ghani spoke about the meaning of the term „In-formation“. H.E. emphasized that we are currently living in an Information Age, in an Information Society, and that Information today is most valuable.

H.E. explained that the increasing complexity of the global economic competition and the extension of information and communication

technologies are forcing corporations and the society to develop a new understanding about the handling of information.

This development from the industrial to the information age, as H.E. pointed out, can be compared to the transition from agricultural to the industrial age. Today, day-to-day life, work and the economy is fundamentally changed through the use of information and communication technologies. To meet these challenges, a thorough strategy plan is required for the development of the state, its administration, and its citizens. H.E. added that there are three options: no strategy at all, a bad strategy, and a good strategy. According to H.E., that a good strategy explains exactly how a goal can be reached, including a corresponding action plan.

H.E. said he wanted to create stable Internet supply for Matrasse, mosque, schools, universities, authorities and private corporations. H.E. criticized that Internet costs in the country are still too expensive compared to other countries, and H.E. expected that Afghanistan soon will have stable power supply. IT staff plays an important role in this development. Further proposals of H.E. were:

- Development of a National IT Strategy Plan for five years in collaboration of the Ministry of Higher Education, the Ministry of Communication and Information Technology, the Central Statistics Organization and Dr. Peroz.
- Development of an Internet Exchange Point for inspection of internet traffic
- Development of a secure email gateway

H.E. was very much looking forward to seeing the results of the work of the ITCC in terms of these proposals at the 14th IT conference in 2018.

Finally, H.E. thanked the organizers of the IT conference Afghanistan and announced that the winner projects.



December 17 - 19, 2018

IT Conference Part XIV in Kabul

Conference topic: IT Strategic Plan for Afghanistan

Day 1: December 17th, 2018

Opening and Welcome

Dr. Najibullah Khwaja Omary, Minister of Higher Education Afghanistan



Dr. Khwaja Omary welcomed all honorable guests to the 14th IT Conference. He said that this conference is the outcome of 14 years of academic effort that has been done in the field of IT in Afghanistan, for which he thanked TU Berlin and Dr. Nazir Peroz and the IT Department of the Ministry of Higher Education of Afghanistan. He continued his speech with a review on growth of IT in the 20th century and the impact on human life.

He stated that internet has played a vital role in the improvement of communication. He mentioned that a vast of research has been done in the field of IT in the world. Considering the experience of other countries, it can be said that conducting and implementing such researches in Afghanistan will lead to social, political and economical improvements.

Dr. Khwaja Omary noted that technological improvement requires both internal and external factors. He explained the internal factor as national determination for the improvement of the society and external factor as international investment. He stated that, to have technological improvements, the plans and policies need to be inlined with internal and external factors. In the continuation of his speech, to insist on the importance of IT on development of a society, he noted that not considering digital vulnerabilities lead to serious failures in developing countries. He counted technological knowledge as an important factor for their productivity and improvement.

As further required applications of IT in the academic field, Dr. Khwaja Omary named access to network, development of information systems, video conference system development, implementation of fiber optic network, creation of national library network and e-learning systems. He appreciated the creative ideas of computer science students and mentioned that the Ministry of Higher Education is committed to provide the environment for their further improvements.

Dr. Khwaja Omary finished his speech by stating that he hoped the results of this conference will help the development and implementation of a national IT strategy plan for Afghanistan.

Message from Mr. Prügel, Ambassador of the German Federal Republic in Kabul

Subsequently, Dr. Nazir Peroz, Head of ZiiK at TU Berlin read the following message from **Mr. Prügel**, Ambassador of the German Federal Republic in Kabul to the guests of the 14th IT Conference in Afghanistan:

Dear Excellencies,

Dear graduates,

It would have been my pleasure to attend today's conference and to hand you your degrees in person. What you have achieved is remarkable and will contribute greatly to the future of your country. With your work and the flagship projects that you have developed, you enable Afghanistan to modernize its administration and the country as a whole.

Your efforts have not gone unnoticed. Whenever H.E. President Ghani talks about the potential and the capabilities of Afghanistan, the IT graduates from TU Berlin are always one of the first assets that seem to come to his mind. Just recently, during the Geneva Conference, he proudly mentioned you and your success story.

What I am particularly fond of is the fact that you are not only the drivers of digitalization and modernization but that you are also Ambassadors of the German-Afghan friendship. With your studies in Germany, you have strengthened the ties between our two countries and are now part of a new generation of young Afghans and Germans that are bound together in friendship.

I sincerely hope that you will be able to maintain your friendships with your German colleagues and I wish you all the best for the bright future, which now lies ahead of you.

Mr. Shahzad Aryobee, Minister of Communications and Information

Technology of Afghanistan (MoCIT)



Mr. Aryobee began his speech by congratulating the ITCC and thanked Dr. Nazir Peroz for his commitment and dedication for all his efforts in the field of computer science in Afghanistan. He congratulated the students who have participated at the IT exhibition and presented their projects. He promised that the Ministry of communication and Information Technology is committed to help in the implementation process of those

projects. He mentioned that there have been investments in the IT sector that lead to lots of job opportunities. In continuation of his speech regarding the investment he mentioned that the fiber optic network which connects 25 provinces and 9 other provinces are under process. From the efforts of the Ministry of Communication and Information Technology, he pointed the implementation of an internal network so called NEXA to which 9 ISPs are connected. This intranet leads to an economic, efficient and secure way of data exchange among governmental organizations.

As current projects of MoCIT he named the following activities: Connecting schools through fiber optic, establishment of IT centers in schools, implementation of digital library, connection of hospitals through Tele Medicine, works on E-agriculture that the contract has already been signed, integration of e-passport and e-tazkera, and postal money service. He pointed out that the number of internet users in Afghanistan increased from 7 million in the year when he was appointed, to 9.7 million in 2018. He ended his speech with the good news of a Research and Development Center establishment, and once again thanked the ITCC Afghanistan and Dr. Peroz for holding the conference.

Message from Dr. Mohammad Najeeb Azizi, Chairman of Afghanistan Telecom Regulatory Authority of Afghanistan (ATRA)

Mr. Ata Yari technical advisor of ATRA talked, on behalf of Dr. Azizi, chairman of ATRA, who was currently traveling. He started his speech welcoming all honorable guests and insisted on the importance of the IT conference. He stated that Afghanistan is still at the level of having poor connectivity that even in Kabul the capital, there is no communication among organizations. He pointed that despite having the IT infrastructure, it is not being used in an efficient way in use and management of data. According to him, another important point to be done is the inclusion of people and organizations in addition to/other than MoCIT. At the end of his speech, he congratulated the organizers of this conference and requested the participants to have active participation and share their knowledge and experience.

Dr. Nazir Peroz, Director of the ZiiK at TU Berlin



Dr. Peroz welcomed all participants of the IT conference and expressed his thanks to the ministers, deputy ministers, deans of computer science faculties, lectures, students, and representatives of other organizations for their participation.

He stated that the IT strategic plan, the topic of this conference is selected based on the request of President Dr. Ghani. He pointed out that the suggestion of the topic

from President Dr. Ghani was based on the survey that has been done by the ITCC team at the ministries in 2017. The survey showed the lack of human resource in the IT field, as well as a lack of power supply, awareness and management. Dr. Peroz mentioned that although the MoCIT has an IT strategy plan, it has some weaknesses that should be discussed during this conference. He stressed that Afghanistan needs a tailored IT Strategic Plan which takes into account the particular situation of the country.

He went on to explain that technological progress is the driver of the Afghan economy, science and society. However, this progress is depending on **basic requirements** like qualified IT professionals, reliable IT infrastructures (power and Internet supply, building services engineering etc.), modern management structures, IT laws and policies, comprehensive and thorough demographic data and statistic information about Afghanistan, as well as available funding.

According to Dr. Peroz, the questions are now: What does Afghanistan want to gain from this technological development? Which role does Afghanistan want to take in a digitized and globalized future? How can Afghanistan secure and strengthen its economic and scientific location through digitization? Which requirements have to be met for a stable, secure and effective digital landscape?

Dr. Peroz stated that he studied the IT strategic plans of other countries within the scope of his seminars, and he came to the conclusion that these strategic plans cannot just be re-used for Afghanistan. However, experiences from other countries show that key elements for the success of digitization in the long term are the basic requirements and the acquisition, processing, connection, integration and protection of data. These aspects form the foundation for an effective use and development of IT systems, algorithms, big data, artificial intelligence, mobile devices, and applications in areas such as e-government, e-commerce, e-health, e-education, cloud services etc.

There are currently only few institutions which have qualified IT professionals, operational and secure IT infrastructures, IT systems and networks, and in most cases, isolated IT solutions are implemented. Such developments and bad planning lead to

- high costs for troubleshooting and debugging,
- violation of privacy, availability and integrity of data and information,
- harm for the future economic and scientific location, and
- dependencies and falling behind innovative development of digitization.

Thus, Dr. Peroz finished his speech by proposing the development of an IT Strategy Plan for Afghanistan which provides answers to these issues.

Keynote speeches

On the first day of the conference, in addition to the opening speeches, four keynote presentations were given on the subject of the IT strategy plan:

Data and information management strategy



Mr. Bahadur Hellali, Deputy Director General for Information Systems Management and Development of the Central Statistics Organisation of Afghanistan

Mr. Hellali started his speech by thanking the organizers and continued by pointing out the existing problems in data management and communication which are listed below:

- No organized data sharing among ministries and directorates
- No coordinated and organized system for data gathering and sharing
- Scarce of data for the research purposes
- No plan and policy for gathering organizational data
- Data duplication

In the continuation of his speech he suggested the creation of a unified framework being coordinated by the Ministry of economy and using a unified formate of data.

Then he pointed out some of the works which have been done in this field: Providing access to data by working on an open data concept which helps the researchers. He shared the website (data.gov.af, start.gov.af) with the IT conference participants. As an infrastructure for data storage and maintenance he named HMIS (Health Management Information System) from which the data can be accessed directly. He also added that they plan to establish a center for obtaining geographical data. He stated that gathering data in different fields lead toward big data and machine learning. In the end of his speech he answered questions of participants.

2018-2022, eGov implementation roadmap & strategy

Mr. Matten Hejran, head of National Data Center, Ministry of Communications and Information Technology of Afghanistan



Mr. Hejran gave an introduction about the services of the MoCIT and continued his speech with explaining the IT roadmap towards eGovernment. He stated that the steps towards eGovernment are connectivity, regulatory, data infrastructure and information security, enterprise service bus, government data and service share, and eServices respectively. In the next part of his speech he talked about the achievement of the MoCIT in regard of IT roadmap steps through e-government.

For the connectivity part the MoCIT is currently working to connect with China through the Wakhan corridor and with Iran from Chabha corridor through Digital CASA. The MoCIT is working to establish secure layers of connectivity (internet) through existing fiber cables to connect the entire government organizations, for data and service sharing between all government organizations.

In regard of the infrastructure he pointed the enhancement of the existing MoCIT National Data Center ANDC. He pointed that based on MoCIT's new plan all government data and services, will be host (place) in ANDC as primary or secondary infrastructure to manage government big data and services. In continuation of his speech he mentioned that there has been progress in cyber security. Currently, the MoCIT is working to implement secure layer of connectivity between the government and public to ensure data security and data integrity through NIXA and Forensic Lab projects. Also, the MoCIT is working on a Cyber Security Law which includes different sections of eTransaction, eSignature, e-Commerce, etc...

He also introduced GRP (Government Resource Planning) as a solution enterprise management. In continuation to progress in e-government he mentioned Asan Khedamat service that has provided solution for some of the existing problems at a few of the Ministries of (Finance, Commerce, Foreign Affairs, Interior..). He ended his speech with giving thanks to the organisers of the IT conference and gave him the opportunity to present the services of the MoCIT.

Development and achievement of IT in MoHE

Ms. Shukria Jamal, Director of the IT Department of the MoHE



Ms. Jamal started her speech with welcoming to the honorable participants of the conference and continued with an overview of the achievements of the IT Directorate of MoHE in 2018:

Seven functional IT Centers have been established by the MoHE with support of the HEDP including the Shahid Ostad Rabani Education University (completed), Faryab University (completed, requires evaluation), Saikh Zaid University (fiber contract signed), Takhar University, Paktiya University, Ghazni University, Kunar University (fiber contract signed). Nine universities have been provided with IT equipment and Internet connectivity is planned for 38 public universities and higher education institutions, from which 28 are completed and 10 other are under process. For the MoHE, services have been enhanced and made more reliable, e.g. with an equipped server room and a solar power system, the renovation of the NOC, as well as capacity improvements of the internet bandwidth.

Ms. Jamal stated in her speech that there is a visible change in increase of internet bandwidth from 2015 to 2018. As part of the future plan she mentioned internet service, fiber optic network, and computer lab projects.

She stated that the IT directorate has made progress in information systems including improved coordination with NSIA, MoCIT & IARCSC, Student Information system development & Implementation (Public & private), HRMIS, and a Statistics System by ITCC Afghanistan.

She continued with the progress in the capacity building programs, some of which are training of technicians/managers of IT-Centers by HEDP, organizing TEIN workshops for Afghan engineers and IT employees, KOHA training for librarians, Website training for webmasters (in two levels), 4 edX workshops (India, MoHE), etc. She ended her speech by giving thanks to the organizers of the IT conference and ATRA for their support in providing internet connection.

Regulatory compliance in the telecommunication marketplace in Afghanistan

Ata Mohammad Yari, Technical Advisor, ATRA



Mr. Yari started his speech with insisting on the importance of regulation. He pointed that regulatory intervention is vital for supporting competition and for creating welfare of consumers. The responsibilities of ATRA include: development of laws for regulating telecom services, control and audition on service quality and illegal activities, frequency auditions, statistics and standardizations, tackling network disruptions, certification and legal issues.

Then he listed some of the works achieved so far by ATRA, including open access projects, which use up to 2% of the overall budget, creation of a policy and guidelines for open access to communication services, connecting 30 universities using fiber optic and provision of internet bandwidth, running 9 projects for providing network coverage for 1,200 sites in 34 provinces of Afghanistan, from which 660 sites have been completed and activated, connecting 22 schools using fiber optic connection and providing them the Internet access.

Mr. Yari talked about the current state of the fiber optic network in Afghanistan and stated that fiber optic cables with a total length of 4,700km along the highway from Kabul, Qandahar, Herat and Mazar-e-Sharif are renewed and functional. This fiber optic network has 7 connecting points to neighboring countries including Iran from Islam Qala, connection to Pakistan in Spin Boldak and Torkham, connection to Tajikistan in Shirkhan Bandar, connection to Uzbekistan in Hairatan, and connection to Turkmenistan in Aqena and Torghandi is completed and functional.

He continued his speech by pointing out the need for having open access to national infrastructure and services. He said that on one hand, based on the current licensing system, Afghan Telecom is the only operator who has the right to own the invariable cable networks and fiber optic networks. On the other hand, there is a day to day increase in the number of customers and users of the communication services, which in long-term, it is impossible to afford the required service by a single operator.

He closed his speech by pointing out the main challenges towards improvement of communication in Afghanistan which are:

- Lack of basic services in lots of areas, specially lack of power in out of the cities
- Lack of basic infrastructure for directing the internal traffic
- Low level of resources, information systems, lack of inclusion policies compared to other countries
- Lack of policy for digital inclusion from other sectors
- Security challenges

Awarding ceremony for the winner projects of the 3rd IT exhibition of faculties of Afghan universities at the ITCC Afghanistan



Handing over of computer science master's certificates to TU Berlin graduates



Further images of the ceremony can be found in the attachment.

Day 2: December 18th, 2018

Workshop: IT Strategy for Education

Moderated by: Dr. Hassan Adelyar, Dean of the Computer Science Faculty at
Kabul University

Introduction



Dr. Adelyar presented the schedule of the workshop about a “strategic plan for IT education”. He stated there were four keynotes in the morning.

Participants of this workshop were from the Ministry of Education, the Ministry of Communication & Information Technology, the Institute for Technical & Vocational Training (TVETA), and lecturers of computer science faculties from different public and private universities. The workshop was moderated by Dr. Sayed Hassan Adelyar. The main objective of this workshop was to discuss the key issues for IT strategy in secondary education, technical and vocational training, and higher education. The workshop activities were divided into three sessions: the first session was allocated to presentations with the following topics:

- **Policy for IT education in schools**, presented by Irfanullah Safi, IT Director, Ministry of Education
- **Policy for IT education in vocational trainings**, presented by Mr. Jalaudin Atayee, Head of policy and planning Department of TVETA
- **Policy for IT education in higher education**, presented by Assistant Prof. Qudratullah Omerkhail Lecturer at the Computer Science Faculty of Shaheed Rabani Education University
- **Impact of e-Learning on education**, presented by Assistant Prof. Farangis Jamalzade, Lecturer at the Computer Science Faculty of Kabul University

The second session of the workshop was for discussion. During this session, the participants of the workshop shared their ideas regarding the appropriate IT strategy for education. The current situations, challenges, and future plans were discussed in detail. During this session the related issues were noted. The third session was in the last day of the conference and during this session the results of the workshop were presented by Assistant Prof. Qudratullah Omerkhail to the conference participants.

In the afternoon, concrete measures about the workshop topics and their implementation have been discussed. Altogether, 45 persons participated in this workshop.

Keynotes

Policy for IT education in schools

Irfanullah Safi, ICT Director, Ministry of Education



Mr. Safi began his presentation by asking the question, „what is IT in education?“ and explained it as the use of computers and electronic communication facilities to support teaching, learning, and educational management practices.

In the following, he stressed the importance of IT in education, as it provides advantages in terms of access, quality, and management.

Mr. Safi then described the current situation and that the MoE has initial capacity for starting IT in Education program. The challenges in Afghanistan, as he went on, are mostly lack of electricity, poor IT infrastructure and Internet facilities at schools, lack of teacher’s capacity to use IT equipment in teaching practices, lack of awareness about the importance of IT, etc.

As a policy to improve the situation, he then proposed a framework for spreading digital literacy across schools in Afghanistan in order to provide Afghan citizens with the required skills.

The next steps, as he suggested, should be to organize workshops with donors, CSOs, and the private sector, and to develop guidelines and a strategy for IT in education.

Policy for IT education in vocational trainings: Current Teaching Materials

Jalaudin Atayee, Head of policy and planning Department of TVETA



Mr. Atayee began his presentation by stating that technical and vocational trainings in Afghanistan are provided by the TVET Authority. TVET targets students of both formal and informal education.

TVET offers trainings in agriculture and animal sciences, technical studies, engineering, oil and gas sciences, industrial studies, management and business studies, special education, art and literature studies

and IT studies.

Mr. Atayee then reported about the current IT situation and the challenges of TVET. In the above sectors, 69,000 students are studying at 301 institutions (at institutes and schools, 29 central and 272 provincial). 18% are female students, and lectures are offered by 4,000 teachers.

Currently TVET has one MIS and one IT department which collect, clean and report institutional data and are offering software and hardware solutions to the offices and staffs.

35% of institutions at national level have access to computers, and less than 3% of the provincial institutions have access to Internet. Almost at all institutions, there are equipment and electricity problems. All schools and institutions are offering IT basics courses, and computer science institutes are offering training in areas of database systems and software development, network and server systems, web design and computer hardware.

Mr. Atayee explained that the current main challenges of TVET institutes and schools are the strong focus on theory and teaching books only, and that they are lacking practical exercise and skill development. Students are not having access to computer lab and internet facilities. At some institutions, computer labs exist, but IT teachers are often not using these labs as they lack skills to use it properly.

Mr. Atayee continued to outline his policy statement that the TVET Authority is planning to expand the area of IT and the field of management in schools and institutes. The emphasis will be on practical oriented trainings and application of IT rather than paper-pencil based trainings. A specific curriculum of IT has been developed in cooperation with the industry.

He finished his presentation by stating that TVET is planning to introduce modern technologies like Internet-based services and educational software in schools and institutes in order to support digitalization processes in teaching and learning.

Policy for IT education in higher education

Assistant Prof. Qudratullah Omarkhail, Lecturer at Computer Science Faculty of Shaheed Rabani Education University Kabul



Mr. Omarkhail first gave an insight of the education and higher education in general in Afghanistan. Then he focused on blended learning, which he considered an innovative concept that embraces the merits of both traditional teaching in the classroom and IT supported learning, with both offline and online learning. It has scope for collaborative learning, constructive learning and computer

assisted learning. Blended learning needs strict efforts, right attitude, enough budget and highly motivated teachers and students for its successful implementation. As it incorporates diverse modes, it is complex and organizing it is a difficult task.

Mr. Omarkhail then discussed how IT can help in e-learning. E-learning is implemented at the Afghan universities since 2015. According to him, the policy is to be modernized and various methods are to be used in schools and universities.

Impact of e-Learning on education and development

Assistant Prof. Farangis Jamalzade, Lecturer at Computer Science Faculty of Kabul University



Mrs. Jamalzade first stated that e-learning has become one of the fastest growing fields of the modern society as it provides means for students to improve their knowledge in any subject independent of location, time and budget with the use of modern digital technologies. She emphasized that e-learning has a great impact on the global delivery of knowledge, as there are no boundaries and limitations for

people to achieve their educational dreams.

Mrs. Jamalzade went on to praise the advantages of e-learning in all areas of education, and the society. Therefore, as she concluded, respective facilities are to be established at all universities and institutions across Afghanistan.

Discussion: Proposals, measures and implementation

In the afternoon, all 45 participants of the workshop “**strategic plan for IT education**” controversially discussed the issues of curriculum, infrastructure, e-learning, communication and IT access policy, as well as research development. The results were presented and discussed on the third conference day.



Workshop: IT Infrastructure Strategy

Moderated by: Prof. Mirza Mohammad Mirza, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Introduction



Prof. Mirza, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, presented the schedule of this workshop to the participants. He explained there were four keynotes in the morning.

The first presentation of the day was from Dr. Mohammad Hassan, Senior Technical and Communication Advisor of Ministry of Communication and Information Technology of Afghanistan, about **“IT Infrastructure”**. The second presentation came from Assistant Prof. Mohammad Nazim Kabeeri, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, and was about a **“Cloud Readiness Assessment in Afghanistan”**. The following speech was from Assistant Prof. Mohammad Najim Wahedi, Lecturer at the Faculty of Construction at Kabul Polytechnic University, about **“Building Facility Requirements in Afghanistan”**. The last presentation was from Assistant Prof. Mohammad Amin Amin and Assistant Prof. Gul Ahmad Loadin, Lecturers at the Faculty of Electromechanic at Kabul Polytechnic University about the **“Effect of power quality and reliability on operation and development of IT/Data centers in Afghanistan”**

In the afternoon, measures and their implementation have been discussed. Altogether, more than 30 persons participated in the workshop.

Keynotes

IT Infrastructure: Afghanistan readiness for acting as a transit route

Dr. Mohammad Hassan, Senior technical and communication advisor, Ministry of Communications and Information Technology of Afghanistan



In this presentation, **Dr. Hassan** introduced the current situation and the future plan of the IT infrastructure of the MCIT.

According to him, IT infrastructure has two parts: network and software. In the network part, there is regional, national, and metropolitan connectivity. Afghanistan has a national fiber network infrastructure owned by national telecom companies (i.e. Afghan Telecom or AFTEL).

Currently, the national fiber network spans over 25 provinces and in the next one to two years this network will connect all 34 provinces. Meanwhile, the AFTEL has connected 23 ministries via 168 points all over the country (including universities, schools, hospitals, etc).

In regional connectivity, Afghanistan has connection with 5 neighboring countries in 7 points. Therefore, AFTEL purchases internet connectivity from neighboring countries, for relatively high prices.

In the future, Afghanistan has a plan to extend its connectivity to China through Wakhan corridor via the Digital Silk Road, as well as through Chahbahar port to reach the submarine cables. Likewise this country will be connected to Europe via Turkmenistan. These new points of connections will provide a number of advantages to the country, such as lower internet costs, establishing of transit routes between south-north, China, and to Middle East countries. In addition to these new connections, the MoCIT and in particular the AFTEL will replace the Synchronous Digital Hierarchy (SDH) fiber technology with Dense Wavelength Division Multiplexing (DWDM) to optimally use the existing fiber infrastructure. Thus, AFTEL can extend its fiber services to more customers. Fiber To The Home (FTTH) is one of the possible service which can be supplied. In terms of systems (software), to better manage Internet service provider activities, the MoCIT has set up an Internet Exchange point (IXP) in Afghanistan called National Internet Exchange Point of Afghanistan (NIXA).

Dr. Hassan closed his speech by stating that at the same time, the MoCIT plans to offer e-platform form services such as e-passport, e-taskira, e-voting, e-traffic, etc.

Cloud Readiness Assessment in Afghanistan

Assistant Prof. Mohammad Nazim Kabeeri, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



Mr. Kabeeri first stated that nowadays, higher education institutions (HEI's) have become more dependent on Information and Communication Technologies (IT's) than ever before. In Afghanistan, as he explained, most of the HEI's are having amateur IT infrastructure and limited IT experts and resources which makes it difficult for them to offer efficient and reliable IT and

educational services to their stakeholders. However, the recent evolvement of cloud computing as a new IT paradigm has been recognized as an efficient and cost-effective solution for facilitating educational services.

Though, putting IT services/resources to third party cloud platforms has some pitfalls that need to be carefully considered prior to the migration. Thus, Mr. Kabeeri aimed at assessing the cloud readiness level of Afghan HEI's and analyze the affecting factors towards its adoption from the perspective of a Technology–Organization–Environment (TOE) framework. A survey was conducted targeting IT staff in public and private HEI's in Afghanistan. Findings indicate that most of the HEI's are currently in the evaluation or early stage of cloud computing adoption, while others are planning to adopt cloud computing in the future.

He went on to explain that Software-as-a-Service (SaaS) is the most commonly used cloud service model. Based on his analysis, poor IT infrastructure, data concerns, regulatory compliance, lack of cloud expertise and compatibility with current IT infrastructure are the main barriers towards adoption of cloud computing. Therefore, building in-house cloud service is highly recommended, but due to lack of proper IT infrastructure, lack of cloud experts and huge investment, it is not going to be possible very soon. Hence, utilizing public cloud services remains the only option for HEI's in Afghanistan, as of now.

Building Facility Requirements in Afghanistan

Assistant Prof. Mohammad Najim Wahedi, Lecturer at the Faculty of Construction at Kabul Polytechnic University



In the beginning, **Mr. Wahedi** stated that technology plays a vital role in every work environment. IT facilitates and accelerates the process of working and increases the productivity in every place including universities and academic centers. Specially, internet as a source of knowledge, communication and digital library is used by academic staff in universities and serves them as an information provider and connector

worldwide.

He pointed out that providing computer labs and delivering IT trainings for students are prominent for an academic institution. IT centers on an academic campus are an essential requirement, that cannot be ignored. Hence, Afghanistan as a third world countries need to complete its path of maturity for IT infrastructure in future, which is good right now, and must be developed for future. Afghanistan universities are poor in viewpoint of IT infrastructure, especially of buildings, except few of them that have it, and need to establish basic and standard IT centers in coming years to meet the demands of students and staffs. Hence, prior to construction, there need to be instructions how to start this mission. By example of the IT Centers of the universities, Mr. Wahedi proposed basic and standard requirements, floor plan, and detailed plans for networking and ducting systems for IT centers in the context of Afghanistan that will be located within campuses of universities.

Effect of power quality and reliability on operation and development of

IT/Data centers in Afghanistan

Assistant Prof. Mohammad Amin Amin and Assistant Prof. Gul Ahmad Loadin, Lecturers at the Faculty of Electromechanic at Kabul Polytechnic University



Mr. Amin and Mr. Loadin first explained the electric power service problems in almost all data centers relate to two main concerns namely power reliability and power quality. Hence the success of data centers and IT centers in today's competitive business environment depends on providing good quality and continuous service. Unreliable and poor-quality power supply to IT/Data centers can cause many challenges such as equipment damages, increasing maintenance and operation costs, malfunctions of various protection

devices, electromagnetic incompatibilities, decreasing overall efficiency and performance of the system. As IT/Data centers, as they went on, are the key infrastructures in most of the organizations, a special attention should be paid to their electric power supply with standard reliability and quality.

After that, they focused on the effects of power quality and reliability on operation and development of several IT/Data centers in Afghanistan. They discussed the reliability indices and security due to poor power quality including the effects of harmonics and inter-harmonics on the operation of IT/Data centers. Based on the results of their research some power quality and reliability enhancement methods are proposed. The results of this research, they recommended the following: Awareness and capacity building of engineers, technicians, and system operators via conferences and workshops. Furthermore, Improving Power quality and reliability in IT/Data centers should be an important objective of the to-be-developed IT strategic plan.

Discussion: Proposals, measures and implementation

In the afternoon, all 30 participants of this workshop discussed the issues which have been presented in the keynotes and the topic of “**IT Infrastructure Strategy**”. The results of this discussion were to be presented and discussed on the third conference day.



Workshop: IT Management Strategy, IT Law, and IT Regulation

Moderated by: Mohammad Sharif, Dean of Faculty of Computer Science, Balkh University

Introduction



Mr. Sharif, Dean of Faculty of Computer Science, Balkh University, presented the schedule of this workshop to the participants. He stated there would be four keynotes in the morning.

The first presentation was from Assistant Prof. Rahimdad Faisal Safi, Lecturer at Computer Science Faculty of Balkh University, about the “**IT Laws and Regulation in Afghanistan**”. As next speaker, Mr. Abidullah Zarghoon, Computer Incidents Response Expert, MoCIT, spoke about “**Challenges and implications of cybersecurity legislation in Afghanistan**”. The next speaker of the day was Abdul Hai Alamyar, General MIS Manager at Kabul University, about “**Involvement of the Private Sector in IT Management**”. As last presenter, Mr Sharif introduced Assistant Prof. Bismillah Hussaini, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, who spoke about “**Cloud Computing: legal and regulatory issues**”.

In the afternoon, measures and their implementation were discussed. Altogether, more than 30 persons participated in the workshop.

Keynotes

IT Laws and Regulation in Afghanistan

Assistant Prof. Rahimdad Faisal Safi, Lecturer at Computer Science Faculty of Balkh University



Mr. Faisal began his speech by stating that IT has revolutionized the way, in which people live and work. Most organizations in all sectors of industry, commerce, non-profit, and government are fundamentally dependent on IT.

However, as he went on, an undesirable side effect of organization' reliance on IT to support the delivery of different services to users is a greater exposure to a diverse set of IT security risks. Therefore, IT law has become a matter of national and global interest and importance. Most of the countries have officially published a set of IT law and regulations in order to reduce the undesired side effects of IT when it is misused. The Afghan government has also formulated a set of IT law and regulations, since some of the governmental organizations have been targeted by several severe cyber-attacks, as Mr. Faisal explained.

The IT related law and regulations in Afghanistan are divided into two categories: 1. the law and regulations that are enforceable and published in official gazette, 2. the law and regulations that are only drafted, but they are neither enforceable nor published in any official gazette. Therefore, according to him, IT related laws and regulations in Afghanistan are not sufficient and drastically need to be enriched. within the scope of an IT Strategy Plan.

Challenges and implications of cybersecurity legislation in Afghanistan

Mr. Abidullah Zarghoon, Computer Incidents Response Expert, MoCIT



Mr. Zarghoon started his speech denoting the current challenges of installing an effective IT Law for Afghanistan. Mr. Zarghoon urged that there is no research center for the development of such laws and regulations for Afghan IT. To define the scope of IT Laws and regulations in Afghanistan, an appropriate feasibility study and research is required on current state of Laws and regulations.

Mr. Zarghoon emphasized that research is important in every section. He stated that all Afghan authorities agree that there is a lack of IT laws in the country, and also of roles and responsibilities. For developing an IT law, as he went on, it is important to include the Ministries of Interior, Defense, and Justice. This will make the cyber security more durable. Making IT or cyber laws must be made a priority, and professionals need to be hired. Also, the support from higher level authorities such as the State President is required. Policy making is not the task of only one organ such as MoCIT, it can be task of every ministry and governmental organ. He stressed that international cooperations are needed for support during cyber attacks, as such cooperations currently do not exist. A respective awareness is required for all users of IT.

Mr. Zarghoon stated that currently, NIXA is being implemented, which requires a strong security concept covering data protection, privacy, data classification, and IT laws. According to him, this is the challenge for the next five years.

Involvement of the Private Sector in IT Management

Abdul Hai Alamyar, General MIS Manager at Kabul University



Mr. Alamyar first explained that involvement of the private sector in IT management in Afghanistan is a mandatory task. For any national plan, the importance or role of the private sector cannot be ignored. It is creating job opportunities, economic growth, and establishes competition in the market.

On the other hand, IT management services provide day-to-day management and operation of IT assets and processes. He claimed there should be a policy for each and every aspect of IT management. In general, IT Strategy is the overall plan which consists of objectives, principles, laws, and regulation of IT and politics relating to the use of technologies within a particular organization. This involves private and public sectors as well in a government, so we must consider their role as an active organ.

Finally, he stated that there are a number of private IT sectors in Afghanistan today which provide high-quality services to the end users. As an example, he mentioned NetLinks, which has 2800+ clients, and more than 250 employees.

Cloud Computing: legal and regulatory issues

Assistant Prof. Bismillah Hussaini, Lecturer at the Computer Engineering and Informatics Faculty at Kabul Polytechnic University



In the beginning of his speech, **Mr. Hussaini** explained that cloud computing provides the delivery of IT and computing services over the networks, particularly through the Internet. It has many potential advantages and enterprise applications.

However, it also introduces its own issues and challenges to be considered. In cloud computing, the data centers and servers are located in various locations all over the world. So, the customer data is no longer under the complete control of the customers themselves. This raises the question of legal governance over the data, conflict of laws, and jurisdiction.

He went on to outline the key legal and regulatory issues associated with cloud computing. The aim is to provide useful information for organizations which are using the cloud services or preparing to migrate to the cloud.

Discussion: Proposals, measures and implementation

In the afternoon, all 30 participants of this workshop discussed the issues which have been presented in the keynotes and the topic of “**IT Management Strategy, IT Law and IT Regulation**”. The results of this discussion were to be presented and discussed on the third conference day.



Day 3: December 19th, 2018

Moderation: Prof. Mukamil Alokozai, President of the Balkh University,
Ms. Shukria Jamal, Director of the IT Department of the MoHE,
Dr. Nazir Peroz, Director of the ZiiK at TU Berlin and Director of the
ITCC Afghanistan

First, Prof. Mukamil Alokozai, President of Balkh University, welcomed all participants to the third conference day and wished all a successful day. Ms. Jamal and Dr. Peroz briefly presented the schedule of this day and stated that the aim of the last conference day was to discuss the results of the three workshops from the day before.

The results of the workshop "IT Strategy for Education" were presented by Mr. Qudratullah Omarkhel, Kabul Education University. The outcome of the workshop "IT Infrastructure Strategy" was presented by Mr. Niaz Mohammad Ramaki, Kabul Polytechnic University. And the conclusion of the workshop "IT Management Strategy, IT Law and IT Regulation" was presented by Mohammad Mustafa Naier, Kabul Polytechnic University.

Results of the Workshop: IT Strategy for Education

Mr. Qudratullah Omarkhel summarized the results of the workshop



Mr. Omarkhel began with a short summary of the presentations from the previous day. He mentioned that the presenters of this workshops were Irfanullah Safi, IT Director MoE; Jalaludin Atayayee, Head of Policy and Planning of TVETA; Qudratullah Omarkhel, Computer science faculty of Shaheed Rabani Education University Kabul; Farangis Jamazada, Computer

science faculty Kabul university; The topics they represented were policy for IT Education in Schools, policy for IT Education in vocation trainings, Blended learning, Impact of e-learning on education and development respectively.

He stated that the participants discussed on integration of IT in our curriculum, to upgrade our IT equipment in schools, TVETA and higher education. He listed the challenges of IT in education discussed in the workshop, as follows:

- Lack of Electricity
- Awareness
- Weak Infrastructure of IT in Education
- Lack of Internet facility at schools
- Lack of teacher's capacity to use IT equipment in teaching practices
- Un-digitized education curriculum, teaching and learning materials
- Non-functional computer labs in schools

In continuation of his speech he added that, as discussed in the workshops, the elements of IT in education are IT in curriculum, professional development, E-learning, IT culture, and IT infrastructure. In the workshop it was discussed that for the integration of IT in the curricula at schools, the following points were recommended:

- Students need to experience IT activities regularly.
- Typing practices for high school students.
- Teachers encouraged to share tried and tested sites.

For vocational training, he listed the following recommendations as result of the workshop:

- Teachers Training
- Capacity building
- IT training center
- Technology literacy

For higher education, he stated that scientific research plays an important role.

During the discussion, the workshop participants discussed about the use of e-learning in schools and vocational schools, as well as in higher education. The results were as follows: Enrichment, Blended learning and Virtual, as well as the following items:

- Local MOOC
- Sharing of teaching materials
- Digital books

For IT Culture, the recommendations were as follows:

- Mind set
- Awareness
- Video-conferencing project with another school
- To initiate new projects with partner schools

Last but not least the recommendations of the workshop for IT infrastructure part were:

- Computer labs
- Digital library
- Recording studio
- portal
- Local campus intranet
- RND center

Results of the Workshop: IT Infrastructure Strategy

Mr. Niaz Mohammad Ramaki summarized the results of the workshop



The summary of the workshop “IT Infrastructure Strategy” was presented by **Mr. Ramaki**, Kabul Polytechnic University. The summary included the conclusion of the workshop’s presentations and the results of the discussions.

Mr. Ramaki explained that this workshop had two parts. The first part was the presentation session in the morning and the second part was questions and discussions in the

afternoon. In the presentation session, there were four speakers from the MoCIT and university lecturers.

The first presentation contained the current IT infrastructure of Afghanistan in terms of connectivity and e-platform application and the future plan of the Afghan Government regarding to the IT infrastructure.

The second presentation was about cloud services for Afghanistan Higher Education Institutions (HEIs). The speaker conducted an assessment to see are the HEIs ready to deploy cloud services? Finally the presentation concluded by proposing a cloud deployment model for HEIs.

The third presentation was about building requirements for IT centers and server rooms of each institutions/organization. In this talk some construction’s guidelines and requirements were suggested for the government to consider when building an IT center or a server room.

The fourth presentation was about power sustainability requirements for a data center or an IT system. The speaker had performed a survey regarding the power system of some IT centers in some governmental organization. He indicated major challenges that these IT infrastructures within organizations are facing today.

In the second part, questions and discussions, some of the participants had raised their questions and concerns regarding current challenges within current IT infrastructures, cloud solutions, IT building and power system. Their questions were either answered by the presenters or meanwhile put to open discussion. The workshop speakers and the participants, after long discussion closed this session with some suggestions as a proposal. Some of the major suggestions were the followings:

- The departments of Curriculum within each computer science faculty should include subjects about building requirements and power requirements of an IT system in their bachelor curriculum.
- When designing new building for any organization by a construction expert, the IT systems building and power requirements should be considered by involving an IT expert and power expert.
- The participants welcomed the establishment of a National Internet Exchange (NIXA) and added that respective security measures should be implemented for it.

- Completion of draft IT Laws and Regulations
- Completion of appropriate and required list of IT Laws and Regulations
- Providing the technical drafts by an authorised association such as ITCRC.
- Composition and completion of general drafts by the Society for IT in Afghanistan.
- Creation of an authorised organ, which is composed of related and required organs in order to implement and monitor legitimate documents that have been created.
- Taking into consideration the rapid changes of IT on the Laws and Regulations with respect to globalisation and cultural sensitivities in editing legitimate documents.
- Expansion and development of IT centres

Discussion



After the summary of the workshops, questions were asked from the audience (see pictures of the discussion) to Mr. Omarkhel, Mr. Ramaki and Mr. Naier, the three presenters.

The questions were about the areas of education, infrastructure, management, IT laws, and IT security.

Regarding education, participants asked if there are concepts for the implementation

of IT at schools, and how teachers could be qualified and acquire IT skills. Some universities still have issues with their IT equipment and are lacking IT centers. Also, the role of e-Learning was discussed controversially. Education in Afghanistan is affected by violence and corruption, especially in the IT sector. Brain drain was also an issue.

In the field of vocational trainings, it was mentioned that teachers are to be further qualified. Another problem which was discussed is the poor power supply in Afghanistan, which hinders the development of IT. As a solution, a reliable and effective power supply was proposed using renewable energies (water, wind, and solar power). The extension of Internet supply has to be pushed forward depending on the location, and under the supervision of experts.

In the field of management, the term responsibility was discussed. The collection of data, as was stated by participants, is an independent source of information in Afghanistan.

The participants were very concerned about the security of the IT systems, as there are daily attacks to IT systems all over the country.

It was the general opinion among the participants that responsibilities need to be clearly assigned by an IT legislation. This will create a foundation for the implementation of measures in all areas and also support a sustainable development.

About the final discussion towards the end of the conference, it can be said that it is of great importance that each particular institution develops their own IT plans. Based on this and on the international development, a long-term IT strategy plan for Afghanistan is to be developed which considers reliable demographic data and statistical information about Afghanistan, a country-wide digital education, reliable power supply, available Internet connectivity, solid building services engineering, a modern management system, modern administrative and management structures, cyber security, IT laws and policies, as well as financial means.

Conclusion

After the discussion, there were concluding speeches by Prof. Alokozai, Mrs. Shukria Jamal, and Dr. Peroz:



Prof. Mokamel Alokozai, President of Balkh University expressed his gratitude to participate in a conference that builds the fundamental bases of Afghanistan. He stressed that this conference has a high value for us, and he complained that MoCIT is not fulfilling its tasks as it should. He went on and praised Dr. Peroz, who initiated these IT projects in Afghanistan when Prof. Alokozai was deputy chancellor of Kabul

University, and he expressed his hope that this 14th IT Conference will provide a vital impulse for the development of the IT landscape of Afghanistan.

He went on to thank MoHE as well as TU Berlin for their support and cooperation.



Mrs. Shukria Jamal, Director of the IT Department of the MoHE first talked about the opportunities that exist in the Afghan government for the Ministry of higher education and especially for the development and support of IT. This shows that there is progress and developments in various sections such as infrastructure, academic working, and other IT related issues. Within these two days of IT Conference, as she went on, many

presentations and workshops were held, and effective outcomes have been achieved. The innovation and creativities are demonstrated in various parts such as infrastructure, education, and legislative documents that have been mentioned by Mr. Mustafa Naier. She suggested to discuss some of the proposals of the workshops at the Ministry of Higher Education. This conference, as she went on, was an order from H.E. President Dr. Ghani in order to establish an IT strategy plan. This strategy plan is to be implemented by the MoHE, MoCIT, CSO, and ITCC Afghanistan.

Mrs. Jamal finally thanked TU Berlin for their support and cooperation during this conference.



Dr. Peroz began his speech by welcoming everyone to the third day of the conference. However there were many discussions during the three conference days, and also many results, he emphasized that the core questions of the conference remained unanswered and were not discussed extensively during the workshops: What do we want from IT in Afghanistan?, What should be the position of Afghanistan in Central Asia in terms of IT?, How can

we utilise IT development in economic, knowledge, culture, government, education, and health in Afghanistan?

He emphasized that based on his experience and analysis of the situation in Afghanistan, the following strategies are required:

- IT infrastructure strategy, which includes Internet connectivity and power supply, and building services engineering
- IT education strategy, which includes school education, vocational training and higher education
- IT management strategy, which determines roles and responsibilities
- IT law and regulations
- IT security strategy

Each of these strategies should to be developed in cooperation with the responsible organizations. Once this is achieved, a base for a sustainable IT development in Afghanistan is created.

Dr. Peroz closed his speech by giving thanks to the IT Department of the MoHE for the smooth cooperation, as well as the speakers from the universities for their contributions. He also thanked the German Federal Foreign Office for the funding.

December 16 - 18, 2019

IT Conference Part XV in Kabul

Conference topic: Measures and Implementation of the Digital Strategy for Afghanistan

Day 1: December 16th, 2019

Opening and Welcome

Prof. Dr. Bary Sediqi, Deputy Minister of Higher Education



Prof. Baray Sidiqi welcomed all honorable guests to the 15th IT Conference. He said that this conference is the outcome of 15 years of academic effort that has been made in the field of IT in Afghanistan, for which he thanked TU Berlin, Dr. Peroz, and the IT Department of the Ministry of Higher Education of Afghanistan. He continued his speech with pointing out the main goals of the Ministry of

Higher Education which are providing access to standard and qualified education under consideration of the job market in Afghanistan, and training of professional and specialist staff. He also said that achieving these goals without the use of technology is impossible. He then listed the plans which the Ministry of Higher Education has prioritized for achieving the mentioned goals:

- Revising and development of universities' curricula; 50% will be completed for 65 different departments till the end of this year (1398).
- Capacity building for university lecturers and administrative staff; 1200 people have received their MSc or PhD degrees this year.
- Evaluation of the quality of education in governmental and private universities and other higher education institutions, and accreditation of governmental and private universities as a result of continuous evaluation; 5 universities have been accredited during this year.
- Applying changes in organizational structures and revising and development of curricula of universities; 15 bills and procedures in different fields and departments have been finalized this year.
- Establishment of the center for research, publishing, and translation, and special attention on performing researches in universities.
- Special attention to Digital Education and the IT Strategic Plan and offering online courses on credible sites.
- Creation of educational and management infrastructure, dormitories, and laboratories for practical programs.
- Special attention to student services in universities, and establishment of a student affairs office at the Ministry of Higher Education.
- Simplification of procedures and insuring transparency and accountability in offices. Special efforts on avoiding corruption.

Dr. Hamdullah Mohib, National Security Adviser of President of the Islamic Republic of Afghanistan and computer scientist



Dr. Mohib began his speech with a warm welcome to all participants of the 15th IT Conference. He expressed his pleasure to attend this conference for the second time. To highlight the positive outcome of the efforts in the IT sector by Dr. Peroz and his team of the TU Berlin, he pointed out that at the time of his first attendance at this conference, the IT situation in Afghanistan was quite different; Internet was much more expensive, and there were many problems. But

now, things had changed very much; different universities have IT centers, and the way for IT training and education has been paved for many students; 100 Afghan students have finished their master's studies at TU Berlin, and are now part of the highly qualified workforce that is needed in order to improve IT and e-government in Afghanistan.

Dr. Mohib added that Afghanistan currently has a bad security situation, but still he is happy and optimistic when looking at the improvements that have been achieved here. The young generation which has been trained during the past 18 years is providing the power to be optimistic and to move towards a developed and stable country which will stand on its own feet.

He stated that IT has positive impacts on the overall security situation; for example, a lot of research and investigations that previously could only be done manually, are now supported by IT tools and methods, and it can be said that a lot of lives have been saved and a lot of attacks have been detected and neutralized since.

Dr. Mohib identified the lack of data and application integrity within different organizations as a serious problem, and he kindly asked the organizers and the Ministry of Communication and Information Technology to provide solutions for integrating all the individual systems which are used in different organizations. He added that, for having a digital government, capacity building and infrastructure would be needed, and considering the expected improvements and developments it should be made possible to move faster towards e-government. As final words, Dr. Mohib thanked the Ministry of Higher Education, Dr. Peroz, the Technical University of Berlin, the Ministry of Communication and Information Technology, and all attendants of the 15th IT conference.

Message from Mr. Prügel, Ambassador of the German Federal Republic in Kabul



Subsequently, **Mr. Naweed Rahmani**, Director of the High Technology Development department of the Ministry of Communication and Information Technology of Afghanistan, and MSc graduate of TU Berlin read the following message from Mr. Prügel, Ambassador of the German Federal Republic in Kabul, to the guests of the 15th IT Conference in Afghanistan:

„Excellencies, Esteemed guests from academia and beyond, and especially Dr. Nazir Peroz, Director of the IT Competence Center of Afghanistan and the Center for International and Intercultural Communication at Berlin Technical University, it would have been a great honor and pleasure to be here today at the opening of this year’s conference on Information Technology in Afghanistan and to address you in person. While I cannot be with you physically, I would not want to miss this opportunity to say a few words. I am thus very grateful that one of the bright young Master graduate of Computer Science will read and convey these words to you.

The German commitment to knowledge exchange and capacity building in Information Technology in Afghanistan dates back to the very early days of postwar support, and it has become an integral part of our efforts here. It began with the Bonn Conference of 2001, when Germany committed itself to support the rebuilding of academic structures in Afghanistan. Two exploratory trips to Kabul in the spring of 2002, which Dr. Peroz joined as the representative for the field of Information Technology, led to the first project – the creation of an IT Center at Kabul University, the first of its kind in the country.

Over the years, German support through Dr. Peroz and the Berlin Technical University intensified and broadened. Together with Kabul University, Kabul Polytechnical University and the Universities of Herat, Balkh, Nangarhar and Kandahar, new Bachelor Programmes in Computer Science were developed and additional IT Centers and libraries of Computer Science were built in these locations.

To date, Afghan staff that was trained by Berlin Technical University has in turn trained more than 30,000 university members in the basics of IT and computers in the five IT Centers that are part of the project. More than thousand students have graduated with Bachelor degrees from the Computer Science Programmes, developed with special regard to the needs of the country, offered by the ten Faculties of Computer Sciences in Afghanistan. This has been made possible by the 100 Afghan Graduates of Master Programmes in Informatics at the Berlin Technical University that now teach in Afghanistan – in Kabul, Herat, Kandahar, Nangarhar, Balkh, Khost, Kunar and Faryab.

Currently, there are 25 Afghan graduate students enrolled at the Technical University of Berlin – from various Afghan institutions and parts of the administration – that will finish their Master’s Degrees in 2020.

And the project has not stopped there. In recent years it has extended into research, with the aim of raising the quality of the IT environment in Afghanistan up to international standard. Since 2014 the Berlin Technical University has been working on a PhD-Programme and the creation of an IT research platform as part of the Afghanistan IT Competence Center. This Competence Center supports lecturers as well as IT projects by students, focusing on issues such as sustainability, the environment, development, and the transfer to digital and IT security.

The past two days marked another important event for IT in Afghanistan: the fourth IT exhibition, in which students presented their projects to a jury. The best five of these projects will be selected and awarded later today and I would like to already now extend my heartfelt congratulations to the bright students that created them.

Today's Conference on Information Technology in Afghanistan is testimony to our longstanding commitment to support the Afghan IT sector. It is the fifteenth conference of its kind, and it has taken place yearly since 2005.

I would like to express my thanks in particular to Dr. Peroz and the Center for International and Intercultural Communication of Berlin Technical University as well as to the Ministry of Higher Education, the Ministry of Communication and the IT Competence Center Afghanistan for making this conference possible, to the Ministry of Higher Education for hosting it. On the background of what has already been achieved over the past 18 years, this conference will be about defining the future digital strategy for Afghanistan and a roadmap for its implementation.

I therefore wish all participants interesting presentations and fruitful discussions over the coming days and I am confident, that also this conference will further strengthen Afghanistan's IT sector and contribute to building a more modern, efficient and prosperous Afghan economy and society.

Thank you

Mr. Fahim Hashimy, Minister of Communications and Information Technology of Afghanistan (MoCIT)



Mr. Hashimy welcomed all guests and began his speech with mentioning the following points: First, he especially thanked Dr. Mohib, as the digital revolution would not be possible without his political support and holistic view of the issue in the government. He said the participation of Mr. Mohib shows that there is political support, and this will expedite the digital revolution in Afghanistan.

Then he thanked Dr. Peroz for his long-term support and hard work, the results of which are visible as a stable foundation of the IT sector in Afghanistan. He is still working hard and the students that graduated from his programs are now training the next generations of IT-experts in Afghanistan. There are already two TU Berlin graduates employed at the Ministry of Communication and Information Technology. And more are needed to work for example in the fields of Big Data, Artificial Intelligence.

He went on and stated that the most important keys to a successful digital revolution are a clear vision, a clear mission, as well as a clear understanding of the digital revolution. We would not be able to achieve the digital revolution until it is set as a national priority, and we are not united enough for that. When we understand the importance of the digital revolution, it wouldn't remain specific to only one sector and it wouldn't remain an IT-only revolution. During this process, technology will help us to achieve progress faster and easier. So, implementation of the digital revolution is not only specific to the Ministry of Communication, or the ITCC. It's a generic and national agenda and revolution, and all involved parties have to implement it together.

During this process, people and human resource management are very important. Mr. Hashimy expressed his believe that the development of an IT strategy is also a shared process between the IT sector, the academic sector, the government and the private sector. When the strategy is developed as a shared process, then its implementation will be easier. So, as he explained, for developing an IT strategy, all affected parties should be in involved, including the users, the academic sector, the infrastructure development team, and the policy team. And the strategy should be developed based on the current situation and the specific requirements of the society, and with inspiration from comparable and successful international projects. Also, the required infrastructure should be assessed, and the required technical knowledge should be specified.

To highlight the importance of the involved staff during the policy and strategy development process, he mentioned that the percentage of roles in a strategy are as follows: 70% people, 20% technology and the remaining 10% for algorithm and procedures which are used. He presumed that this conference will be helpful since it brings the different parties together to propose a useful IT strategy.

Mr. Hashimy then mentioned some of the achievements of his Ministry. The digital agenda has been proposed, other plans and strategies have been developed, and for each strategy, a specific policy has been made, and a clear vision and a clear mission has been defined.

He expressed his hope that other parties join them soon and that they can move forward together. The sector of IT affects all other sectors, and it can be said that IT is the future of all other sectors, and that the economy depends on it. As an example for this, he pointed out that the economy of most nations world-wide has turned digital and makes use of data and new technologies, even in fields like agriculture. Not only telecommunication tools and devices can be used, but the process and analysis of the data that we find in social media and other resources, lets us move towards an electronic government.

He added that he is optimistic about moving forward towards a digital and electronic government, but this is impossible without support and cooperation. Finally, he again thanked Dr. Peroz and his team.

Dr. Nazir Peroz, Director of the ZiiK at TU Berlin



Dr. Peroz welcomed all participants of the IT conference and expressed his thanks to the ministers, deputy ministers, national security advisor of the President, deans of computer science faculties, lecturers, students and representatives of other organizations for their participation.

He stated that the topic of this conference is the Digital Strategy 2020, and tha as Mr. Hashimy also stated, a strategy always needs a

plan. He further specified that the strategy itself is a vision for which a plan is required to make that dream come true. He then introduced four main phases of that plan:

1. Initialization
2. Strategic Analysis
3. Strategic Development
4. Strategic Implementation

Dr. Peroz went on to explain that after the initialization phase, the strategic analysis process begins, which is followed by a strategic concept, and ends with a strategic implementation.

In the initialization phase, usually, the leading board which includes several ministers and the presidents plan to have a new strategy. For this purpose, an interdisciplinary team consisting of technical, social, and academic members is needed. The competence of the staff should be well considered, as he stressed. When this team is formed, the leadership should grant them the needed responsibilities as well as the needed authority, and they should be introduced formally as the responsible team.

The second phase is a strategic analysis, for which the past and present should be studied, and based on the existing problems, a solution should be proposed. Then, a mission with a well-defined goal needs to be developed, as Dr. Peroz stated. The next phase is an implementation, which needs to have a clear plan. Part of that plan is to manage and control the project time. Another important issue is the project completion, which is a serious issue,

since there are a lot of projects that were run but never got completed due to a lack of time, budget, and resource management. As example of these shortages, he mentioned that the IT Center at the University of Nangarhar has been closed due to a lack of financial support, and also experienced staff from the IT Center at Kabul University already left their jobs for the same reason.

Dr. Peroz then mentioned risk management as a crucial issue, and he pointed out some examples where the possible risks were not considered and where the projects ended up unsuccessful. Those projects are examples of management failure that should be considered during the concept phase.

He added that, after the 13th IT conference, when President Ashraf Ghani asked the participants to create an IT strategy for Afghanistan, he, together with Mr. Ayobi, Mr. Khwaja Omary, and Mr. Rasuli started with an analytical process. During this process, some critical issues were discovered, for example a lack of technical staff, infrastructure, differences between the structures of IT centers, and the economic situation.

Dr. Peroz stated that one of the outcomes of the 14th IT conference of 2018 was that the most important thing for a successful strategy is to have reliable infrastructures including technical staff and proper management.

He went on and stressed that for a successful implementation of services like e-government, e-commerce, e-learning, e-health, etc. the basic requirements and effective IT structures have to be established first.

Dr. Peroz also mentioned that the topic of Big Data should be considered, and that cloud systems and storage should not be used carelessly because of security and privacy issues. As a solution he proposed the establishment of data centers in Afghanistan and storing the data locally. He also counted sustainability and security as the two most important issues while working on data centers.

He then listed the requirements for an IT strategy for Afghanistan as having technical staff, proper documentation, modeling and understanding of responsibilities, responsiveness, laws and regulations, and stable electricity.

He went on to propose that until the end of 2020, all involved organizations should create a clear strategy, and in the end, all of those strategies should be put together to form an overall IT strategy for Afghanistan. Having such a strategy will enable the country to implement all of those IT services in Afghanistan. He also pointed out that it should be kept in mind that if only one of the partial strategies is failing, the overall strategy will fail in the end.

Dr. Peroz finished his speech by thanking once again all participants of the 15th IT conference in Afghanistan.

Presentation of the five winning IT projects and Prize Ceremony of the Exhibition of Student's IT Projects from computer science faculties of Afghan universities

Project Title: Lie Detector

Name: Mursal Azizi

University: Herat University

Introduction:



Afghanistan's criminal activities are high and getting higher every day. Terrorist groups are getting stronger and even taking influence in governmental offices which can result in catastrophic incidents and which is jeopardizing national security. At the same time, other criminal activities such as kidnapping, robbery, murders, raping, homicide, conspiracy and solicitation are increasing everyday threatening social life, business and development.

When suspects are questioned by the authorities, there is often uncertainty if the person tells the truth. A lie detector or polygraph will help government agencies to detect if a criminal tells lies. The secret behind it the measurement of changes occurring in the body such as heart rate, blood pressure, respiratory rate, electro-dermal activity, skin flexibility and arm and leg motions. The detector will compare the results to trained values during true and lied statements and then decide if statements are true or a lie.

Aim of the Project:

During the project, a polygraph device using an Arduino device and two sensors is to be developed. A galvanic skin sensor measures the subject's skin reaction, and an electrocardiogram measures movements of the person's heart. The device is attached to the person's hand and chest to monitor his/her body activity while being questioned by police or in court.

Project Title: Shkolaa
Name: Samira Ahmadzai
University: Kandahar University

Introduction:



This project is about creating a marketplace for valuable handicrafts made or manufactured by Afghan women. A website is to be created which provides all information about the handicrafts. Products can be bought through an online shop, and items will be delivered to the buyer.

Aim of the Project

Women play a crucial role in the development of Afghanistan's economy.

Fortunately, an increasing number of women are currently being educated and participate in the economic cycles of the country. Yet there are still thousands of women who would be able to manufacture products of large value. But due to the lack of proper marketing and advertising, they either are not producing at all or producing less than they could. Also, they receive low prices for their products. This website will advertise their products nationally and internationally and will enable them to support their families and the economy of the country.

Project Title: Student Affairs Management System
Name: Muhammadullah Adil
University: Kabul Polytechnic University

Introduction:



The Student Affairs Management System (SAMS) developed in this project is a web-based management system for the computer science faculty of Kabul Polytechnic University and covers all administrative tasks of faculty registration, all kinds of forms generation, attendance management, exams management, feedback management, report generation, monograph management, transcript generation and further activities.

All these tasks are currently performed paper-based or file-based on desktop computers, and there is no centralized system for connecting students with the administration and the teachers. As a result, every educational record is stored in separate files. Storing and searching information, and the work with official and unofficial forms like transcripts is a very time consuming task. Therefore, with this project, a central database is proposed and implemented that provides a student affair management system as a web-based application to store all information of the faculty and perform all above-mentioned activities in an

automated, fast and accurate manner, according to global standards and under consideration of administrative policies.

Aim of the Project

The main goal of the proposed project is to develop and implement a reliable and scalable management information system with high performance using free and open source software solutions for controlling and maintaining all information of the faculty.

The system is to be secure, reliable, and easily updateable, and teachers are to have online access in order to perform tasks that are currently done manually. It will give students online access to their data and to management functionalities, and it will generate reports for faculty, students and staff.

Project Title: Towards a system to aid communication with the deaf (Ava)

Name: Mehreen Najm & Ahmad Zai

University: Kabul University

Introduction:



In this project, a system has been developed to communicate with hearing impaired persons. It is an interactive translation system to assist in the completion of a conversation between an ordinary person and a deaf person. The system translates the ordinary person's speech into American Sign Language (ASL) and displays the signs using a specially-developed avatar. A comprehensive approach to the task of enabling humans who are not proficient in ASL

to communicate with hearing-impaired people requires the development of a general-purpose speech-to-sign language converter. This in turn requires the solution of the following problems:

- Automatic speech to text conversion (speech recognition)
- Automatic translation of English text into a suitable representation of sign language
- Display of this representation as a sequence of signs using computer graphics techniques

Aim of the Project

An efficient mechanism is suggested to aid deaf people to easily communicate with hearing people. This will allow hearing-impaired persons to better participate in society and to better connect with the people surrounding them.

Project Title: SmartFire Control System

Name: Abdul Sami Ameri

University: Nangarhar University

Introduction:



This project proposes a fire protection system to detect smoke and automatically send messages or calls the the fire department and the owner of the affected building, shop, house, vehicle, etc..

When a fire is deteced, a buzzer is triggered, and a message or call with information about the alarm and location of the fire is sent out. Also fire extinguishing systems are triggered, which use water or gas to fight the fire automatically. If the fire could be extinguished successfully, another message will be sent accordingly.

Aim of the Project:

- This project aims at protecting people from injury or death from fire, as well as other damage. And it can support the fire attendance with additional information.
- It is to be implemented throughout Afghanistan. People should be made aware of the importance of this system and technology.

Day 2: December 17th, 2019

Workshop: Digital Education

Moderated by: Dr. Hassan Adelyar, Dean of the Computer Science Faculty at Kabul University

Introduction



Dr. Hassan Adelyar presented the schedule of the workshop on “Digital Education” and stated the main objectives. Participants of this workshop came from the Ministry of Higher Education (Higher Education leadership, lecturers of computer science faculties from public and private universities, and IT administrators), the Ministry of Education, the Ministry of Communication & Information Technology,

and the Institute for Technical & Vocational Training (TVETA). The main aim of the workshop was to discuss the key measures for digitalization of higher education schools, technical and vocational training institutes, as well as raising awareness about digital education. The workshop activities were divided into two sessions: the first session was dedicated to presentations.

The second session of the workshop was reserved for a discussion. During this session, the participants of the workshop shared their ideas regarding the measures to implement a digital strategy. Altogether, 45 persons participated in this workshop.

Keynotes

Measures for Digital Education in Higher Education

Shukria Jamal, Director of the IT Department of the MoHE



Ms. Jamal began her presentation with the introduction of MoHE’s efforts of the development of quality teaching and learning and the development of higher education, and continued with an overview of the achievements of the IT Department in 2019.

She continued to talk about the e-learning progress in higher education and the definition of the MoHE on e-learning in Afghanistan: e-learning is the use of ICT for supporting teaching and learning not

to provide online degrees. She also mentioned local courses in local languages, i.e. Pashto and Dari, and international (AfghanX) courses.

Furthermore, she pointed out the completion of nine public universities recording Studios and that the MoHE is continuing to build these facilities at other public universities as well.

Additionally, she gave information on the collaboration between the MoHE and the IITB, the MoU, the MHRD, and the Indian Government (SWAYAM, Capacity Building Program, Virtual Labs). She also talked about the increasing Internet bandwidths (management still is a challenge), and the IT projects of the ATRA (PC labs, campus fiber networks, Internet, eduroam projects, ICT Centers).

Finally, she explained the future plan for digital education development of the IT Department of MoHE in 2020, in particular providing Internet access, establishment of IT labs, ICT centers and Wifi access zones.

Measures for Digital Education in Schools

Irfanullah Safi, ICT Director, Ministry of Education



Mr. Safi began his presentation by explaining the importance of ICT in education, the relation of his Ministry of Education (MoE) to each family in the country. He also mentioned the capacity building programs, infrastructure, Internet access and ICT facilities to support teaching, learning, and educational management procedures. He highlighted the completion of an ICT policy development, and then

explained the plans and programs of the MoE for digital education development.

Mr. Safi then described the current situation and capacities for starting an IT in Education program. The challenges in Afghanistan, as he went on, are mostly the lack of electricity, the poor IT infrastructure and Internet facilities at schools, the lack of teacher's capacity to use IT equipment in teaching practices, and the lack of awareness of the importance of IT.

In addition, he mentioned the completion of 35 e-training centers in the provinces and he named a few points of the 10-year plan of the MoE in digital technology: to connecting 10,000 schools to electricity, establishing 10,000 computer labs, Training 150,000 teachers, training 6 million students on the use of ICT in education, and raising digital awareness for 10,000 communities.

Measures for digital education in TVET Schools and Institutions

Mr. Obaidullah (Head of TVET-MIS)



Mr. Obaidullah began his presentation by stating that TVET targets students of both formal and informal education. TVET offers trainings in eight sectors including agriculture and animal sciences, technical studies, engineering, oil and gas sciences, industrial studies, management and business studies, special education, art and literature studies and IT studies. He then continued to speak about the

current education-relevant challenges of TVET, being that students are not having access to computer labs and Internet facilities.

He then explained the future plan of TVET with the following objectives:

- What IT skills have to be developed?
- How could the learning processes in TVET be digitalized?
- How will IT enable accountability?
- Capacity building programs
- Development of concept notes for spoken tutorials (supporting e-learning, A/V contents development in local languages)

Measures for raising awareness of digital education in society

Mr. Qudrattullah Omerkhel Lecturer at Shaheed prof. Rabani Education University



Mr. Omerkhel started his presentation by emphasizing how digital technologies can enrich learning in a variety of ways and offer learning opportunities that are accessible to all. It opens up access to a wealth of information and resources.

While there are many opportunities arising from digital transformation, the biggest risk today is a society that

is not prepared for the future. If education is to be the backbone of growth and inclusion in Afghanistan, a key task is to prepare citizens to make the most of the opportunities and meet the challenges of a fast-moving, globalized and interconnected world.

Digital advances also bring new challenges for Afghanistan's pupils, students and teachers. Algorithms used by social media sites and news portals can be powerful amplifiers of bias or fake news, while data privacy has become a key concern in the digital society. Young people as well as adults are vulnerable to cyber bullying and harassment, predatory behavior or disturbing online content. Everyday exposure to digital data driven largely by inscrutable algorithms creates clear risks and requires more than ever critical thinking and the ability to engage positively and competently in the digital environment. We face a constantly evolving need for media literacy and a wide mix of digital skills and competences including safety, security and privacy, but getting them to the wider population and more advanced professions and sectors remains a challenge.

Discussion: Proposals, measures and implementation

In the second session of the workshop the 45 participants discussed about **digital education** development at the MoHE, the MoE and the TVET and shared their ideas and suggestions regarding the appropriate digital education development. The results of this discussion were to be presented and discussed on the third conference day.



Workshop: Digital Infrastructure

Moderated by: Ass. Prof. Zia Sana, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University

Introduction



Mr. Zia, Dean of the Computer Engineering and Informatics Faculty at Kabul Polytechnic University, presented the schedule of this workshop to the participants. He announced that there were four keynotes in the morning.

Participants of this workshop came from the Ministry of Higher Education (Higher Education leadership, lecturers of computer science faculties from public and private universities, and IT administrators), and the Ministry of

Communication & Information Technology. The main aim of the workshop was to discuss the key measures of infrastructure. The workshop activities were divided into two sessions: the first session was dedicated to presentations.

The second session of the workshop was reserved for discussions. During this session, the participants of the workshop shared their ideas regarding the measures to implement a digital strategy. Altogether, 30 persons participated in this workshop.

Digital CASA: Challenges, Opportunities and the Role of SMEs

Omar Mansoor Ansari, President TechNation Vice Chairman, Internet Society Afghanistan

In the beginning, **Mr. Ansari** introduced the CASA project which is a joint project between 13 countries from central Asia. Digital CASA is a World Bank funded program with the following objectives:

- Increase access to affordable Internet services
- Improve government's capacity to deliver digital public services
- Facilitate opportunities for a digitally-enabled future generation
- Enhance regional collaboration



Subsequently, the following challenges for the Digital CASA project have been discussed:

- Security
- Skills
- Employment
- Policy/regulations
- Connectivity (cost/QoS)
- Limited ICT use
- Private investment
- SME/ startup support
- Integration/collaboration
- Landlocked (CA)

Also, the following opportunities for the Digital CASA have also been discussed:

- Open economy
- Competitive telecom sector
- Eurasia/ EU
- Links to China, Central and South Asia
- Qualified IT professionals
- Access to cheap green energy
- Strong political will

He ended the presentation by adding some recommendations regarding this project:

- SME/Entrepreneurship support
- Skills/ leadership building
- Infrastructure/ sharing
- Policy
- Regional collaboration

Intelligent Transportation Systems

M. Saleem Nezami, IT Director of the Ministry of Transportation

Mr. Nezami began his presentation by introducing intelligent transportation systems (ITS) which are based on the following technologies:

- car navigation
- traffic signal control systems
- container management systems
- variable message signs
- automatic number plate recognition
- speed cameras for traffic control
- RFID



Mr. Nezami mentioned that the Ministry of Transportation (MoT) is already in the phase of ITS implementation. The services that are ready to launch are driver license, vehicle

registration and toll gates. These services are waiting for the order of H.E. State President to be operated.

Information Technology in Afghanistan: DABS

Said Hussain Yosufi, IT Director of Da Afghanistan Breshna Sherkat (DABS, Afghanistan National Power Utility)

Mr. Yosufi started his talk by introducing the IT systems of the DABS:

- SCADA (Supervisory Control and Data Acquisition): National Load Control Center & Telecommunications through OPGW cables
- Data Center: primary site of DABS
- Disaster Recovery Site
- Storage Area Network (SAN)



He added that DABS uses information systems for two particular purposes, customer and staff management.

He then presented the business plan of the DABS:

- Using existing Optical Ground Wire (OPGW) cable, replacing current multiple ISP from DABS for cutting internal cost
- Providing Data, Voice, Cable services for households

Discussion: Proposals, measures and implementation

In the afternoon, all 30 participants of this workshop discussed the issues that have been presented in the keynotes and the topic of “**Digital Infrastructure**”. The results of this discussion were to be presented and discussed on the third conference day.



Workshop: Digital Management Strategy, IT Law, and IT Regulation

Moderated by: Assistant Prof. Rahimdad Faisal Safi, Dean of Faculty of Computer Science, Balkh University

Introduction



The workshop was moderated by **Mr. Rahimdad Faisal Safi**, Dean of Computer Science Faculty, Balkh University.

Participants of this workshop were lecturers and students from Afghan universities, ATRA, the National Security Council, and the MoCIT. The main aim of the workshop was to discuss the key measures for Digital strategies, laws and regulations. The workshop activities were divided into two sessions: the first session

was dedicated to the presentations.

The second session of the workshop was reserved for discussions. During this session, the participants of the workshop shared their ideas regarding the measures to implement a digital strategy. Altogether, 30 persons participated in this workshop.

Keynotes

Measure for Regulatory Compliance in the Telecommunication Marketplace in Afghanistan

Ata Mohammad Yari, Technical Advisor, ATRA

Mr. Ata Mohamad Yari, began his presentation by providing some numbers on existing



mobile network operators in Afghanistan (5), Internet Services Providers (62), Value Added Services (103), WiMAX (2), Optical Fiber Connectivity Network (5800Km, in 25 Provinces, with 5 Operators), 3G Subscribers (7.6M) and 4G (518K) and others. ATRA, as he went on, was established in 2005 under the Ministry of Communication and Information Technology and became an independent authority in 2017 by the

decree of H.E. State President.

Mr. Ata further provided information on regulatory compliance in the telecommunication market under the Open Access Policy. In the first stage, as he explained, the Open Access Policy was developed, and in the second stage areas were defined such as Open Access Regulations, Fiber Optic Licensing, and 4G Spectrum Licensing. In the third stage, Open Access Regulations were further divided into Infrastructure Sharing Implementation and Local Content Development. Similarly, Fiber Optic Licensing is divided into the use of Universal Access Fund and establishment of IXPs, and the 4G Spectrum Licensing is extended to Mobile Quality of Service Enforcement. The Open Access Policy's Implementation regulations are defined as:

- Interconnection Regulation
- Price Cap Rules and Procedures
- Reference Interconnection Offer
- OFC Interconnection and Tariff Procedures
- OFC Right of Way Guideline
- OFC Quality of Service Procedure
- MNP Procedure, License, RFP
- Quality of Services Procedure
- 4G Frequency Auction Policy Documents

Last but not least, as he stressed that ATRA also supports the public domain such as education, higher education, and health through universal funds like the Telecom Development Fund (TDF). In this regard, they already connected 43 Afghan Universities via OFC for Internet access, plus a number of achievements like 115 IT Labs and 18 OFC for Schools. 58 hospitals are in contracting process. 8 IT labs plus Internet Services are established in Religious centers.

He concluded that ATRA is contributing for the regulatory compliance in the telecommunication marketplace by defining regulations and procedures that bring transparency and equal opportunities in the telecom market-place. They also participate in the development of digital infrastructure and provide internet services to the public domain.

Cybercrime and e-Transaction/e-Signature Laws of Afghanistan

Zmarialai Wafa, General Director for the evaluation of cyber threats in the National Security Council office



Mr. Wafa began his speech by quoting the definition of cybercrime as “any crime that involves a computer and network. The computer may have been used in the commission of a crime, or it may be the target”.

In general, he defined two types of crime, the conventional crimes and modern crimes. In conventional crimes nearly all crimes are local and evidence is mostly found at the crime scene. Modern crimes are often committed remotely and are boundary-less. Fighting such kind of crime requires specialized procedures, forensics, cooperation and legal assistances across borders. Additionally, he mentioned to have a distinction between Electronic-Crimes and Cyber-Crimes. Electronic-Crime is a crime within an intranet while Cyber-Crime is a crime outside the intranet, it is global (over Internet).

Furthermore, he mentioned the impact of cyber-crimes according to recent research done by Juniper which said, by 2019, the cybercrime cost for business will be over 2\$ Trillion. He also mentioned that by 2021, global cyber-crime damage costs will be 6\$ trillion.

He then listed the state of cybercrimes in Afghanistan:

- Financial Cases: False transactions of money from account to account for the purpose of theft
- False Transactions: People are not regularly checking their accounts which may results in losing their balance and when the check they notice unknown transactions. It may happen through technical errors as well.
- Identity Theft: Creating fake accounts by using others’ identity
- Email Spoofing: There are a lot of spoofed emails that target people
- Hate-ism: People use social media to propagate hate in communities
- Skiddies (Script Kiddies): There are a lot of young people who learn scripts and try it out with different organizations’ applications.

For the prevention the above points, law enforcement is compulsory, as he stressed. A workshop conducted in Istanbul, Turkey titled “law enforcement” was held in May 2015.

In the following, Mr. Wafa pointed out some of the drafts laws which are:

- Cyber Law
- Cybercrime Law
- Offenses
- Power and Procedures
- International Cooperation
- E-Transaction and E-Signature Law
- Electronic Transactions

- E-Payment
- Public Key Infrastructure (PKI)
- Certification Authority (CA)
- Registration and Verification Authorities

Measures for the involvement of the Private Sector in IT Management

Naweed Rahmani, Director of the High Technology Development, Ministry of Communication and Information Technology of Afghanistan



Mr. Rahmani began his presentation by defining the importance of the private sector in IT management. He mentioned that the role of the private sector is to generate revenue, have better up-to-date human resources, and deliver best quality products to the market place.

Furthermore, he mentioned that IT plays an important role for a digitalized economy in Afghanistan, of which the private sector is a part of. He said, according to digital economy report by UNCTAD in 2019, digital economy has three scopes: core (digital IT/ICT sector), narrow scope (digital economy), and broad scope (digitalized economy). The core scope contains hardware manufacture, software and IT consulting, information services, and telecommunications. The narrow scope of a digital economy is digital services and platforms for the digital economy, and the broad scope contains e-Business, e-Commerce, Industry 4.0, precision agriculture, algorithmic economy and so on.

Furthermore, he mentioned that IT plays an important role for a digitalized economy in Afghanistan, of which the private sector is a part of.

Mr. Rahmani then highlighted that two countries (USA and China) run the overall digital economy in different areas of technologies. He mentioned that 75% of all patents related to blockchain technologies, 50% of global spending on IoT, and more than 75% of the cloud computing market belong to the USA and China.

Moreover, Mr. Rahmani described the importance of data in the digital economy. According to a report, he explained that in 1992 the total amount of data generated per day was (100GB/Day), while in 2022 the total amount will be (150700/sec). So, data and information is wealth, therefore MoCIT aims to define different job positions towards the digital economy. Mr. Rahmani said, that the MoCIT plays an important role to encourage and motivate the private sector and he stated that the MoCIT aims to allow different start-ups/entrepreneurs, create a technology park for innovation, create infrastructures for IT development, and works on capacity building of technical staff.

Mr Rahmani further explained that the digital economy in Afghanistan has not yet been considered and discussed on a national level; however, the core scope of the digital economy has been active in Afghanistan since 2001, when the first mobile network (MNO) company (Afghan Wireless Communication Company) was established. The core ICT sector in Afghanistan had exponential growth taking into account the MNOs penetration and use of ICT in different sectors.

Currently, the government of the Islamic Republic of Afghanistan focuses on this phenomenon by introducing a general directorate in Organizational Structure of the Ministry of Communication and Information Technology and promoting e-payment systems as well as the e-business in the country. The aim is to create an ecosystem for the digital economy in the country consisting its five major pillars; digital government, infrastructure, digital skills & values, innovation-based entrepreneurship and digital business.

Also, as Mr. Rahmani concluded, the Government of the Islamic Republic of Afghanistan aims to promote and facilitate the digital transformation in order to establish transparency and efficiency in terms of service delivery as well as creating an economic corridor which can generate revenue sources by creating and capturing values of the digital economy. It is certain that the future of the world will be shaped by the digital economy, and Afghanistan aims to be part of that and wants to contribute to the development of this phenomenon in order to establish the foundations for further growth of the digital economy in national and international levels.

Measures for Cloud Computing: Legal and Regulatory Issues

Aziz Taqwa, Director General of ICT, Ministry of Communication and Information Technology of Afghanistan



Mr. Taqwa started his speech by defining what cloud computing is and talked about cloud computing models, types of cloud computing, and benefits and legal issues. Cloud computing allows organizations to access a pool or network of computing resources that are owned and maintained by a third party via the Internet.

He explained that there are three different cloud computing models defined: software as a service, platform as a service and infrastructure as a service. Cloud Computing is divided into four: private cloud, public cloud, hybrid cloud and community cloud. The benefits of cloud computing are reduced costs, resource sharing, consumption based cost, faster time to roll out new services, and dynamic resource availability. Mr. Taqwa explained that, despite all benefits, there is also a number of challenges:

- For liability, he mentioned that cloud providers can be held liable for illegal data they may be hosting. Secondly, he mentioned that the majority of cloud service providers believe that security of data is the customer's responsibility, while customers often only think about the lowest costs.
- Data Protection is a challenge to keep the data save.
- Data Portability can be loosely described as the free flow of people's personal information across the internet, within their control.
- Compliance: The Cloud service provider shall publish the rules and regulations, privacy policy and user agreement for access or usage of the intermediary's data. Cloud compliance is about complying with the laws and regulation that apply to use the cloud.
- Copyright: The main concern with cloud computing services with regard to copyright is whether the law is able to address copyright issues arising from this technology

- Laws and regulations typically specify who within the parties should be held responsible and accountable for data accuracy and security.
- Cross-border legal issues: The data centers and servers are located in various locations all over the world. This raises questions of legal governance over the data. In case of a conflict between the cloud service provider and the customer which country's court system will settle the dispute?



At the end, Mr. Taqwa mentioned some of the services that are already provided by the Afghan National Data Center (ANDC):

| ANDC Cloud Services | | | |
|---------------------|-----------------------|-------------------|----------------|
| No | Types of Services | Government Sector | Private Sector |
| 1 | Co-Location Services | 18 | 3 |
| 2 | Dedicated Server | 1 | 0 |
| 3 | Web and Email Hosting | 138 | 0 |

Discussion: Proposals, measures and implementation

In the afternoon, all 30 participants of this workshop discussed the issues that have been presented in the keynotes and the topic of “**Digital Management Strategy, IT Law, and IT Regulation**”. The results of this discussion were to be presented and discussed on the third conference day.



Day 3: December 18th, 2019

Moderation:

- Dr. A. Seyer Mahjoor, Deputy Minister of Higher Education of Afghanistan for Finance and Administration
- Prof. Dr. Osman Babury, former Deputy Minister of Higher Education of Afghanistan
- Dr. Hadi Hedayeti, Deputy Minister of Communication and Information Technology of Afghanistan
- Dr. Nazir Peroz, Director of the ZiiK at TU Berlin and Director of the ITCC Afghanistan



Dr. Peroz began his speech by welcoming everyone to the third day of the conference. He stated that there were many discussions during the workshops of the previous day, and that the results are going to be presented and discussed today. He then briefly presented the schedule of this day.

Prof. Dr. Mahjoor, Deputy Minister of Higher Education of Afghanistan, welcomed all guests and said there are four key elements of modern technology which play an important role today:

- Our modern society cannot live without technology today.
- Technology and Good governance can fight corruption.
- Technology plays an important part for academic education and vocational training.
- A healthy competition will push the young generation to further develop technology.

After his speech, the results of the workshop "Digital Education" were presented by **Mr. Qudratullah Omarkhel**, Kabul Education University. The outcome of the workshop "**Digital Infrastructure**" was presented by Mr. Kasra Habib, Balkh University, and the conclusion of the workshop "**Digital Management Strategy, IT Law, and IT Regulation**" was presented by Mr. Shukraulla Waseeb, Nangahar University.

Results of the Workshop: Digital Education

Mr. Qudratullah Omarkhel summarized the results of the workshop



Mr. Omarkhel gave a short summary of the presentations from the workshop activities. The topics of this workshop were measures for Digital Education in Higher Education, Measures for Digital Education in Schools, Measures for Digital Education in vocational trainings and Measures for raising awareness of Digital Education in society respectively.

Mr. Omerkhel stated that during the second session of the workshop, the participants discussed and agreed on the following tasks for all three participating organizations (MoHE, MoE and TVET):

- Joint Digital Education board
- Computer labs, Internet connectivity, LMS (Learning management system)
- Teacher capacity building (TTC, Non-Computer)
- Update curricula (Computer concept)
- Content digitization in local language (PDF, A/V & simulation)
- Online resources (MOOCs, YouTube, Digital library, khan academy)
- Learning APPs (Edu-games, Analytical, Digital kankor prep, Adult)

For schools, he listed the following recommendations as result of the workshop:

- Computer Lab
- Basic digital literacy (for both teachers and students)
- Typing, simulation

For vocational training, he listed the following recommendations as result of the workshop:

- Fulfill technical market needs
- Practical aspects of both software and hardware

For Higher education, he listed the following recommendations as result of the workshop:

- Fostering academic research
- Adapting emerging technologies
- Increase the number of computer science faculties

Results of the Workshop: Digital Infrastructure

Mr. Kasra Habib, Balkh University

Mr. Habib gave a short summary of the presentations from the workshop on Digital Infrastructure:

- **Establishing an ICT Council:** an independent and authorized standardization and implementation council which is responsible to control and conduct assessments of the government organizations
- **Resource Sharing (Services):** collaboration of the government organizations for sharing their IT resources among each other
- **Simplifying the application process in government departments:** this has two aspects; 1. legal procedures should be shortened and 2. IT systems should be developed in a way that is user-friendly and easy to use.
- **Involvement of the private sector:** the government is responsible for making policies and regulations and IT projects should be outsourced
- **Decentralized solar energy systems for all organizations of the government:** Solar power as a renewable energy source should be used for governmental organizations, but organized and managed centrally
- **System integration:** currently, most IT systems in governmental organizations are isolated and operated independently, and hence data exchange between organizations is difficult. Therefore, all systems should be integrated and made compatible.



Results of the Workshop: Digital Management Strategy, IT Law, and IT Regulation

Mr. Shukraulla, Nangahar University



In the beginning, **Mr. Shukirulla** stated that during the workshop, there was an intensive discussion based on the presentations and experiences of the participants from the various institutions. It became clear that plans and policies are already in place, the missing part is a proper mechanism for digital strategy initiation, development, and implementation. Accordingly, some areas were identified that

need improvement:

- Responsibilities and accountability
- Measures
- Sustainability issues
- Alignment with international standards and experiences
- Risk assessments procedures
- Budget reliability and sustainability
- Political interference
- Expertise involvement (existence of monopolies)
- Communication & coordination
- Proper independent quality assurance and control mechanism

The discussion participants determined and proposed the following digital strategy procedure for a successful digital transformation, based on Dr. Peroz' presentation on the first conference day:



Discussion



After this summary, questions were asked by the audience to Mr. Omarkhel, Mr. Habib and Mr. Shukirulla.

With the presence of strategic procedures for a digital transformation, the participants recommended that government institutions (Ministries, ATRA, MoCIT etc.), the civil society, donors, and the private sector should provide a 5-year strategic plan for digital transformation.



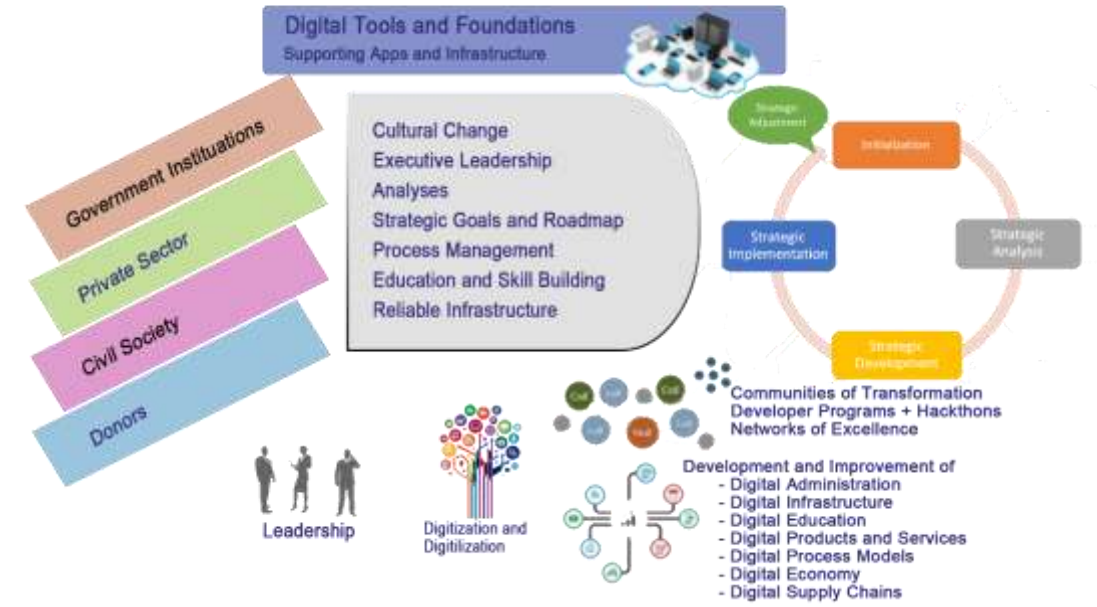
Similarly, an observer entity is required to facilitate and coordinate this digital transformation process. Hence, participants proposed the establishment of an independent platform named “National Digital Transformation Forum of Afghanistan” under the supervision of H.E. the State President. This forum should comprise of interdisciplinary and competent teams (national/international) in different areas such as

administration (policy makers, procurement specialists, process management specialists), infrastructure (construction, power supply, mechanical, environmental, etc.), finance (budget, revenue, expenditures, economists, etc.), technology (enterprise software development, cyber security, Industry 4.0, IoT, big data, machine learning, cloud computing, etc.), legislation (laws, regulations, procedures, etc.) etc. This team is to ensure a smooth digital transformation operation.

Eventually, a draft framework was proposed which is to support the successful digital transformation process:

Proposal: National Digital Transformation Forum of Afghanistan (NDTFA)

Supervision: H.E. President
Digital Transformation Framework



Conclusion

After the discussion, there were concluding speeches by Prof. Dr. Babury, Dr. Hadi Hedayeti and Dr. Peroz:



Prof. Dr. Babury emphasized again the importance of the conference topic this year. Much debate has been going on in the past about various strategies, but only little about measures and implementation.

Even though this topic has not been sufficiently discussed in the workshops, the participants came up with concrete results in the end.

Prof. Babury thanked the workshop presenters and stressed that IT has become a vital part of day-to-day life. Public authorities, universities and the entire society can benefit a lot from this.

Prof. Babury thanked the workshop presenters and stressed that IT has become a vital part of day-to-day life. Public authorities, universities and the entire society can benefit a lot from this.



Dr. Hadi Hedayeti expressed his thanks that the MoCIT was co-organizing this IT conference. He also thanked the workshop participants for the results.

He offered the support of the MoCIT for the implementation of this proposal. Afghanistan has a lot of catching-up to do in this field.

In his speech, Dr. Nazir Peroz emphasized that based on his experience and analysis of the situation in Afghanistan, the following strategies are required:

- Digital infrastructure strategy, which includes Internet connectivity and power supply, and building services engineering
- Digital education strategy, which includes school education, vocational training and higher education
- Digital management strategy, which determines roles and responsibilities
- Digital law and regulations
- Digital security strategy

Each of these strategies should be developed in cooperation with the responsible organizations. Once this is achieved, a foundation for a sustainable IT development in Afghanistan will be created.

Dr. Peroz closed his speech by giving thanks to the MoHE, the MoCIT, and ATRA for the smooth cooperation, the security advisor of the President for his participation at the conference as well as the speakers from the universities for their contributions. He also thanked the German Federal Foreign Office and DAAD for the funding.

Presentation of the results of the IT Conference part XV at the ARG Palace



On December 21st, Dr. Peroz presented the results of this year's IT Exhibition and IT Conference to the State President Dr. Ghani at the ARG Palace. The event was attended by the German Ambassador, Mr. Prügel, the Minister of Higher Education, Mr. Balakarzai, two representatives of the Ministry of Higher Education, the Head of the Central Statistics Authority, Mr. Rasuli, lectures from computer science faculties of Afghan universities, and students. At first, Dr. Peroz briefly described the goals and scopes of the two events:



The fourth IT Exhibition took place on December 14th and 15th at the ITCC Afghanistan, and computer science faculties of 16 public and private Afghan universities were invited to participate. Altogether, 54 student's IT projects were nominated, and a professional jury with five lecturers from the Universities of Kabul, Polytechnic University Kabul, as well as ITCC employees selected 20 of these to participate at the IT Exhibition.



Another jury with representatives from science, politics and the industry selected the five best of these projects.



The 15th IT Conference had the topic „Digital Strategy Afghanistan“, and H.E. the State President of Afghanistan initiated the development of this strategy in December 2017. Meanwhile, two strategies have been developed, one is the result of the 14th IT

Conference in 2018 and was developed by representatives of science, politics and the industry. The second has been developed by Dr. Qayoumi, Mr. Rasuli und Mr. Hotaki.

The initial goal of the 15th IT Conference this year was to discuss both digital strategies with the invited IT experts from Afghan universities, corporations and institutions, and to develop concrete measures for the implementation of a common digital strategy for Afghanistan.

Dr. Peroz expressed his confidence that Afghanistan will only be able to make use of all the opportunities of the digital technologies (e.g. E-Government, E-Education, big data, cloud services, artificial intelligence, Internet of Things, Industry 4.0, Smart Technologies, etc.), when the Afghan government solves a number of issues and isolated IT solutions like e.g.:

- lack of sound data
- lack of qualified IT personnel
- lack of management systems
- lack of reliable IT infrastructures (power supply, Internet access, buildings, etc.)
- insecure and unreliable IT systems
- unreliable research, corporate, and government networks
- uncritical implementation of hard- and software from abroad
- lack of IT laws and regulations

Experiences from other countries show the consequences of such development and bad planning:

- high costs (additional costs to eliminate mistakes from the past)
- violation of privacy, availability of personal data and information
- dependency from foreign countries
- digital backwardness

In the following, Dr. Peroz summarized the results of the IT Conference:

According to him, the more than 200 participants said that the availability of qualified IT staff, reliable and secure IT infrastructures, an effective management system, as well as the collection, processing, integration and protection of data are key for long-term and successful digital location Afghanistan.

These factors are the foundation for an effective employment and development of products of digital technologies. Dr. Peroz then stated that Afghanistan needs to ask itself what it wishes to gain from the digital development.

In order to counter the issues of the current situation, as Dr. Peroz finished his speech, the country needs a platform that takes care of the requirements of IT and digitization. For this platform, a „National Forum for digital transformation in Afghanistan (NFDTA)“ should be proposed.

After this presentation, H.E. State President thanked Dr. Peroz, and said he knew him since 2006, when he was president of Kabul University. Back then, he and his wife didn't have Internet access, but the IT Center of Kabul University enabled them to connect to the Internet for the first time. H.E. praised Dr. Peroz for his commitment to Afghanistan and for supporting the country and for providing qualified IT staff to the entire country. Therefore, he expressed his gratitude for Germany and the long-term friendship and support in this field.

H.E. continued that IT is the driver of the fourth industrial revolution. The development of these technologies can simplify many processes, provide employment for the people, and has many other advantages. H.E. commented on Dr. Peroz' presentation and suggested to speak of IT ecosystems rather than IT landscapes. According to him, this will be a central task. H.E. would like to develop Afghanistan with the help of IT. Most of all, he expects Internet technologies to improve the digital economy. The Ministry of Communication and IT has developed an extensive concept for this, as he stated. The plan of Kabul is a good example for this, and H.E. said he would also like to support the fields of import and export with IT. H.E. also announced to fight for lowering the costs of Internet connectivity for the people, as it is still way too expensive.

Then H.E. expressed his hope in the young men and women. He confirmed that Afghanistan lacks qualified IT staff and management, and that there were isolated IT solutions at the institutions. He also complained about the lack of data and information, and said he still didn't know exact numbers of pupils, students, teachers, and lectures. He also doesn't have data about import and export. He confirmed Dr. Peroz' statement that Afghanistan needs to ask itself what it would like to gain from IT.

Next year, as H.E. went on, the area of IT and Digitalization will be included in the government budget and receive more than 100 million Afghani.

Eventually, H.E. asked the MoCIT, the Central Statistics Authority, and Dr. Peroz to cooperate, and promised his support. He said he also counted on the Master's graduates from TU Berlin, and it is H.E. big request to develop a digital concept for the Ministry of Higher Education.

○

Pictures from the meeting with H.E. Dr. Ghani



January 6th – 13th, 2021

Graduation Ceremony for Computer Science Master's Students from Afghanistan in Berlin

Day 1: January 6th, 2021

Opening and Welcome

Dr. Nazir Peroz opened the colloquium by welcoming all students as well as the professors, lecturers, and the team of the ZiiK of TU Berlin.

He emphasized that the Computer Science Master's Program for Afghan students at TU Berlin aims to educate qualified IT experts from Afghan authorities and universities in a demand-oriented way and according to the requirements of their home institutions in Afghanistan.



Within the past four generations of this program, 100 Afghan students participated in this program, 98 of which graduated from TU Berlin with a Master's degree in computer science. They all returned to their home universities as lecturers in order to foster academic, research, and education in computer science, as well as establish and expand IT structures in the country. Today, the past graduates have leading positions as deans, vice deans, heads of IT, etc., at their respective universities, in public institutions, or in the private sector.

The 25 participants of the fifth generation of the Computer Science Master's Program for Afghan students began their studies at TU Berlin in October 2018. After their graduation end of January 2021, they will return to their home institutions. He is pleased that this week after more than two years of hard work you are presenting the results of your master's thesis to your scientific supervisor. The defenses of your master's theses and the graduation ceremony from January 6th through 13th, 2021, was organized as a video conference due to the ongoing Corona pandemic.

We invited for the graduation ceremony on January 13th H.E. Rula Ghani, First Lady of Afghanistan, Prof. Dr. Abass Basir, Minister for Higher Education in Afghanistan, Mr. Nader Nadery, Chairman of the Independent Commission for Administrative Reform and Public Service, Mr. Yama Yari, Ambassador of the Embassy of the Islamic Republic of Afghanistan in Berlin, Mr. Markus Potzel, special representative for Afghanistan and Pakistan of the German Foreign Office and further guests from the fields of science, politics and economy.

The guests are welcomed by Prof. Dr. Hans-Ulrich Heiss, Vice President of the TU Berlin welcomed on January 13th.

He then thanked the office of the First Lady of Afghanistan, the Independent Administrative Reform and Civil Service Commission of Afghanistan, and the Ministry of Higher Education for their support, which helped immensely start the 2018/2019 winter semester of the program as planned. Finally, Dr. Peroz thanked the German Federal Foreign Office for the financial support for this program.

In the end, Dr. Peroz wished all students much luck and success in the defenses of their master's theses and gave the word to the first student, Mr. Ahmad Farhad Wardak.

Mr. Ahmad Farhad Wardak:

"E-Government Challenges for Developing Countries: Concept Development for a Pension Management System for Afghanistan"



In his thesis, Mr. Wardak focused on the public sector and E-Government solutions in Afghanistan. Thus, he developed and proposed a concept for an IT-based pension management system, which is to replace the current paper-based operation at the responsible Ministry of Labor & Social Affairs. During his presentation, he focused on the current situation and the requirements of such a solution.

For his research, Mr. Wardak discussed internal procedures and aspects like interoperability and change management. He also suggested best practices to follow, which are also based on research findings from examples in other countries.

His work focused on transformation and integration of processes and managing interdependencies with other E-Government services.

To achieve these goals, as he explained, there are several requirements and challenges to meet in Afghanistan and its public administration. In his thesis, he suggests a solution to these, also in comparison to similar projects and experiences in different developing countries. He also described different perspectives to the solution, like user/pensioner, MOLSA employee, and external public organizations. Finally, he explained the technical and infrastructure requirements for this project and how to implement them.

Mr. Ahmad Fawad Ghezdiwal

"Moving towards Free and Open-Source Software in Afghan Public Institutions - Challenges and Solutions"

In his thesis, Mr. Ghezdiwal proposes a concept to increase the adoption of Free/Open Source Software (FOSS) technologies at Afghan institutions. First, he highlighted the main advantages and benefits of such a policy: Accessible and editable source code, minimizing investments in proprietary software licenses, and preventing usage of pirated/illegal/cracked software in the Afghan government.

For his research, he conducted qualitative interviews on location at Afghan institutions and online surveys. Based on these results, he suggested that Linux OS and FOSS should replace existing systems in many places, and Linux and FOSS should be the default choice for governmental institutions.



To reach this goal, he developed and presented a policy framework for the Afghan government to fully take advantage of FOSS and raise awareness for Afghan governmental employees and Afghan society.

Mr. Ahmad Zaker Zaki

"Concept Development for Publication Management at Afghan Universities"

In his research, Mr. Zaki develops an IT-based system to manage scientific publications at Afghan universities. One of the drivers of this idea is a new regulation in Afghanistan which forces every lecturer to publish at least one academic article per semester. This creates new challenges for the management and publication of this increased number of publications.

Mr. Zaki's approach tries to provide an easy-to-use application that includes different use-cases including publishing, searching, and reviewing articles. Once implemented, this concept is to support all university members with their day-to-day academic duties, as it covers not only publication but also administrative processes. Finally, he stressed that such a system would make the publication of scientific articles easier and increase their overall quality, as reviewing procedures will be facilitated and made much more straightforward.



The concept discusses functional and non-functional requirements, as well as the system architecture and data model. To implement the system, Mr. Zaki suggested an MVC-based design pattern and to use the Laravel PHP framework, as well as an open-source stack of tools for deployment.

Mr. Najibullah Mohammadi

"Developing a Concept for a Management Information System for the Anti-Corruption Justice Center Afghanistan"



In his thesis, Mr. Najibullah develops a concept for a Management Information System for the Anti-Corruption Justice Center (ACJC) of the Afghan Government. This governmental body is responsible for solving corruption cases in Afghanistan and supporting lawsuits against offenders.

For his research, Mr. Najibullah assessed and analyzed the current organizational and administrative structures at the ACJC, which are mostly still paper-based. His concept covers stakeholders and available infrastructures and identifies and also describes roles and responsibilities within the proposed solution.

In his presentation, he also showcased a live prototype of the system, which he developed as a PHP/Laravel web application. He thus was able to demonstrate different roles and tasks and show the system and user interface in action.

Ms. Zahra Azimy

"Concept Development for National Cloud Services in Afghanistan"



Mrs. Azimy developed and proposed a general concept for a general nation-wide establishment and adoption of cloud-based IT services in Afghanistan. With a focus on eGovernment services, both Afghan public institutions and all citizens benefit from these with better quality and availability of such services.

She also emphasized the reduced costs and other benefits and pointed at the challenges and prerequisites that need to be implemented first.

For her research, Mrs. Azimy assessed the current IT situation at governmental institutions and explored similar projects in different countries. As a result, she developed a concept plan for a nation-wide project, "Afghan National Cloud "(ANC), which covers technical foundations, as well as processes, roles, and responsibilities. In conclusion, Mrs. Azimy proposed a road-map for the ANC implementation, including setup, management, and migration of existing infrastructures and services.

Mr. Ghulam Hussain Ahmadi

"Concept of an electronic payment system for transportation taxes in Afghanistan."



Mr. Ahmadi introduced his work on bringing transport taxes in Afghanistan to the digital age by describing the current paper-based tax collection system and its shortcomings. These include not only inefficiency but also fraud, corruption, and lack of transparency.

He then outlined the requirements for a modern electronic system and presented the payment and vehicle tracking technology he evaluated during his master's thesis. Mr. Ahmadi acknowledged that the electronic system must carefully ensure the security of payments while improving in all the major areas where the old system had shortcomings.

With the data gathered from his research and communication with the Afghan Ministry of Transport, Mr. Ahmadi proposed a system that covers relevant stakeholders' requirements. He discusses the strengths of his system, as well as potential challenges that could impede its adoption.

Mr. Mohammad Khalid Siddiqi

"Security and Localization of Governmental IP traffic in Afghanistan."

Mr. Siddiqi presented his work on improving the security of the Afghan government's IT communication infrastructure. A weak point that was identified and was the motivation for the Master thesis was the use of international and/or unencrypted communication links for critical government IP traffic.

To address this issue, Mr. Siddiqi proposes improving coordination and expanding peering among national ISPs to avoid domestic IP traffic being routed via international communication links. Furthermore, he recommends using strong encryption tunnels for government IP traffic.

Mr. Siddiqi analyzed and compared technology suitable for this task and designed a prototype implementation that can run in an environment that simulates the existing Afghan national fiber optic ring (OFC). With the interested parties' help, a larger scale test network could be set up to further obtain experience and investigate potential challenges for a nation-wide roll-out.



Mr. Mohammad Sharif Rezaie

"A proposal for integrating computer security topics into the computer science curriculum at Afghan universities."



Mr. Rezaie described the state of computer security teaching in the Afghan higher education computer science curriculum and put that in contrast to Afghan employers' requirements, rise in reported computer security incidents in Afghanistan, and inadequate computer security practices followed in Afghanistan today.

He then identified areas where security awareness needs to be improved among computer science graduates, where the teaching of security concepts needs to be expanded, and which infrastructure must be created by universities to enable the improved teaching.

Mr. Rezaie listed several areas in the computer science curriculum of Afghan universities where he proposes additional computer security courses, as well as strengthening computer security topics in lectures on other subjects. In order to enable students and academic staff to familiarize themselves more with computer security, Mr. Rezaie proposes the creation of a Computer Security Lab at each university, which is equipped with the necessary computer and networking hardware and software to allow simulation, experimentation, and teaching to be conducted.

Mr. Noorullah Noori

"Security, Usability and Accessibility Analysis of Government Websites in Afghanistan"

Mr. Noori presented his work on the state of Afghan government websites in security, usability, and accessibility, outlining how important these aspects are for communication between the government and citizens.

He then summarized incidents where government websites were attacked and defaced by domestic and international adversaries and how these could have been prevented. Mr. Noori discussed how usability affects user satisfaction and the effectiveness of interaction with a website, and how Afghanistan's high illiteracy rates necessitate making government websites accessible to such users.

With the help of questionnaires and automated scanning tools for security, usability, and accessibility, Mr. Noori identified several potential issues with Afghan government websites. He then proceeded to discuss the actual severity of the issues. He then made recommendations on how to solve the security issues and on how to improve usability and accessibility in future website deployments.



Mr. Shafiqullah Raufi

"A Concept for the Adoption of Green IT for Developing Countries: A Case Study on Powering Afghan Datacenters"



Mr. Raufi's motivation for his work on Afghan datacenters was their high primary energy needs that place a burden on Afghanistan's underdeveloped power grid, which was one of the limiting factors in installing more computing capacity in Afghanistan. In order to become more power-efficient, novel and sustainable methods have to be employed at Afghan datacenters, as he concluded.

He discussed alternative sources of primary power, which will also help the carbon footprint of data centers, as well as higher efficiency power distribution inside datacenters. Based on reports from existing high-efficiency data centers, Mr. Raufi proposed a concept for direct current (DC) power distribution and described the integration with alternative energy sources such as solar and wind energy and the challenges that an implementation of this type would face in Afghanistan.

Mr. Abdul Qader Hakimi

"A Concept Study on E-Work Permit in Afghanistan"



In his thesis, Mr. Abdul Qader Hakimi stated the importance of ICT and e-Governance in the last three decades in the Afghan government. The ICT sector has played a significant role in improving the government's bureaucracy and public services. The sector promises to connect its citizens to financial services, information, and public services, creating jobs and new enterprises. We can see these changes more in the civil service sector. Electric driver's license, ID (E-Tazkira), and e-passport are among essential electrical services recently put into operation. These services facilitate the issuing of driving license, ID, and Passport and prevent corruption and increase service delivery speed.

Furthermore, his thesis focuses on developing a concept for an E-Work permit system for the Afghan Ministry of Labor and Social Affairs (MoLSA). Currently, obtaining a work permit is only possible in person. Thus, as he explained, applicants must spend much time to be able to obtain a work permit. With the help of evaluating Afghan employees and interviews with relevant bodies, comparing developing countries, and researching this field, his thesis aims to offer a concept for digitizing Afghanistan's work permit system. In the fifth chapter of his thesis, he delivers a concept for digitalizing the work permit system that saves time and makes it easier to get a work permit. Furthermore, it also considers all the risks that arise after digitalizing the work permit system and foresight strategies to solve them.

Finally, he stated: The e-government department of the Ministry of Communications and Technology works on an X-road (Afg-road) that wants to operate all services online and without dependence in the future. In this concept's future plan, it is stated that the work permit will be one of the services integrated into this road.

Mr. Ali Ahmad Nazari

"Concept for decentralized electronic patient record in Afghanistan."



Mr. Nazari stated that using the information and communication technology in the healthcare system helps increase the quality and efficiency of the healthcare system in Afghanistan.

He argued that the current Afghan healthcare system is no longer sufficient for managing and recording the patient health record, and both healthcare providers and patients face many challenges. The foremost challenges of the current healthcare system highlighted in his thesis are patient health record availability, standardization, time-consuming, and illegible handwriting.

During his thesis work, he studied different national EHR approaches from Estonia, Canada, India, and South Africa countries to propose a proper EHR system for Afghanistan. He proposed a decentralized electronic patient record (EPR) for the Afghanistan healthcare system to address the highlighted challenges. The proposed system will be used by the Afghan healthcare providers and the Ministry of Public Health to raise the administration procedures, improve patient treatments, and increase the healthcare system's quality and efficiency. Furthermore, the EPR system will help in generating health statistic reports for future health planning.

Ms. Fariha Ghiasi

"Concept for an Electronic Vehicle Registration System in Afghanistan"

In her thesis, Mrs. Fariha Ghiasi states that governments in most developed and underdeveloped countries worldwide transfer their public services from traditional to digital services with the growth of technology and digitalization. Further, she outlines that as a developing country, Afghanistan also wants to improve its public services with the help of technology to make them efficient, reliable, and transparent.

She claims that Afghanistan already initialized its first step towards digitalization and e-services by making a digital foundation strategy. However, she states that the concept of digitalization is general and in its early stages of development and requires concrete concepts for individual public services. So she focuses on the growing number of vehicles and their importance for transportation and researches vehicle registration. Therefore she concludes that vehicle registration is an administrative process of high relevance for Afghanistan, and vehicle registration is a public service provided by the government for the public, which is paper-based at present.



For this purpose, she proposes developing a concept for the electronic vehicle registration system in Afghanistan. To prove her point, Mrs. Fariha Ghiasi analyzes the requirement for vehicle

registration and offers a strategy for implementing an electronic vehicle registration system by identifying the main administrative processes involved in the vehicle registration procedure and document them in a structured manner.

Mr. Khosrow Kian

"On the analysis of political sentiment in presidential elections in Afghanistan using social media data."



In his thesis, Mr. Kian states that people using social media are used to exchange their opinion regarding diverse aspects of life activities. He demonstrated that Facebook is an origin for sentiment analysis to identify the polarity of view to understand the people's orientation about the topic.

Mr. Kian focused on political sentiment analysis to determine Dari's text's polarity with data about the presidential elections in Afghanistan 2019 on Facebook. He created a model to identify Dari's text's polarity (Positive, Negative, and Neutral) by using a supervised machine learning algorithm. In this research, two techniques, Support Vector Machine (SVM) and Naïve Bayes (NB), for Dari text classification are investigated. The Bag of words (BOW)

method is used for the text vectorization to measure each classifier's performance and determine which classifier is more accurate for Dari political sentiment analysis. The performance evaluations were based on the F1-score value as the precision and recall both important equally. As a result, the NB method is more accurate than the SVM method.

Mr. Masoud Faizi

"Sentiment analysis of Dari-English based on Natural Language Processing."

Mr. Faizi stated that sentiment analysis is the most useful social media monitoring method and that it helps to calculate customer satisfaction by applying sentiment analysis on social media data and can minimize production costs for a company.

Mr. Faizi observed that people in Afghanistan today use a new writing method in the Dari/Persian language by writing Dari text in English alphabets (Dari-English). He stated that understanding the writer's opinion is extremely important. In his work, he aims to examine the sentiment of Dari-English, e.g., positive, negative, and neutral by using machine learning text classification methods for analyzing sentiments.



More specifically, he applies Support Vector Machines and Naïve Bayes learning algorithms to classify the Dari-English text's sentiment. For each classifier, he conducts a grid search using 5-fold cross-validation to optimize the parameters. Feature extractions were carried out with the Bag of words and TF-IDF models. To evaluate the models, he computed the f1-scores metrics. Based on his experimental findings, he observes that the Naive Bayes model achieves a higher degree of f1-score than the SVM model on the Dari-English text classification. He further notices that TF-IDF is the most efficient vectorizing method in the Naive Bayes model.

Ms. Ahdia Qaeym

"E-Services for Female Entrepreneurship in Afghanistan - Facilitating the Employment of Afghan Women"



This research suggests a concept that facilitates the employment of Afghan women. Afghanistan, a developing country, needs more effort and attention to be developed. Women make up most of the country's population; bringing more women into the job industry means making considerable changes in the country. Employment of women decreases poverty, increases educated generation, and society will be civilized.

Job employment is a significant development factor in Afghanistan, and the employment process is a complicated and time-consuming process for companies.

Because of restrictions against women's employment and cultural problems, women cannot keep their career and work in a job. The thesis proposed to solve the issues mentioned above and to simplify the employment of women. Mrs. Qaeym stated that a comprehensive recruitment system could add the benefits of saved time, money, and labor to how a business manages position openings. By adopting an approach with the right recruitment software features, as she went on, a company can improve all recruitment processes and simplify searching and finding jobs for job seekers, especially for females. In her research, an online enhanced job portal is proposed to automate job searching, apply for appropriate job and CV translations for female jobseekers, and shortlist process for job providers. The method of automation is performed by comparing the jobseeker's data, which is entered while creating a profile with the announced job requirements, which is provided by the company/job provider while publishing the job announcement.

Mr. Masoud Mustamandi

"A road-map for designing and the introduction of governmental e-services in developing countries - A case study on governmental e-services in Afghanistan."



Mr. Mustamandi began his speech by explaining that there is growing evidence that e-government can facilitate governmental processes and bridge the gap between citizens and governments. However, many e-government initiatives fail due to a lack of adequate infrastructure in developing countries.

In his thesis, he focuses on developing a road-map for the introduction and designing of e-government services in Afghanistan. His study aimed to facilitate the introduction of e-services by prioritizing requisite activities and providing recommendations in a research-based road-map. He proposed a road-map that contains a four-stage iterative model and is sketched after analyzing the current state of e-government and ICT infrastructure in Afghanistan. Besides, he evaluated this proposed road-map by comparing it with the existing e-government maturity models.

Mr. Ahmad Rashid Hazem

"On Deep Learning Named Entity Recognition for Pashto"

Mr. Hazem discussed the principle of automatic extraction of essential information from text documents, which emerges from the first phase in natural language processing. Unstructured text is all around us, as he explained, such as digital news, social media, blogging, and its importance is increasingly growing. This huge available amount of data would not be useful if there were no adequate methods to analyze and derive knowledge. Information extraction can help to manage it.



He then explained that Named entity recognition (NER) is an important subtask of information extraction and plays a vital role in several applications, including information retrieval, question answering, machine translation, text clustering, semantic annotation, and opinion mining. NER is a mechanism by which all named entities in a document are described and classified into predefined classes such as a person, organization, location, and time. Traditional machine learning methods require a significant amount of feature engineering and additional handcrafted dictionaries to achieve high performance. Deep learning has recently been used in NER systems, empowered by continuous real-valued vector representations and semantic composition through nonlinear processing, yielding state-of-the-art results.

In his thesis, Mr. Hazem describes the development of a Named Entity Recognition (NER) system for Pashto. He recommends Pashto Named Entity Recognition (PNER) based on deep learning. Mainly, he uses two comparative models: (1) a bidirectional LSTM (BiLSTM) as an architecture and word embedding as a feature extractor and (2) a BiLSTM with the conditional random field (BiLSTM-CRF) layer to predict the output labels. With the CoNLL tagging method, a Pashto corpus of size 64,400 words was developed. The experiment results show that the BiLSTM model achieved the highest F-score of 85%, which surpassed the BiLSTM-CRF model.

Mr. Mohammad Fawad Naimi

"A Study on Interoperability Challenges in Digital Government Information Systems in Afghanistan"

At the beginning of his presentation, Mr. Naimi explained how recent advancement in computer systems and applications has made it possible for digital government strategies to guide themselves in the implementation phase in the least developed countries like Afghanistan in order to provide better digital services for the citizens. In digital government information systems, as he went on, an essential concept is interoperability. This concept's primary goal is that different information systems should interact with each other and exchange data.



He stressed that a lack of interoperability among different systems could result in loss of budget and time while developing applications and failure of the government's digital strategy. Additionally, over recent decades, numerous interoperability solutions have been introduced by researchers. Accordingly, he conducted a systematic literature review in his study to find out the notable gaps and best practices and compare the significant interoperability frameworks considering the developing and developed countries of Asia and Europe from the perspectives of discussed interoperability levels, policy points of view, and recommendations.

He expects his study to pave the way for future research in this domain, considering a set of features or recommendations to design a solid information systems interoperability framework from the perspective of technology and the semantic, organizational, legal, and political aspects in the context of Afghanistan. Lastly, he suggested a set of guidelines that address the fundamental challenges and requirements for a robust digital government infrastructure to support interoperability.

Mr. Qadeer Ahmad Aziz

"Parts-of-Speech Tagging for Pashto Using Machine Learning-Based Approaches"



In his thesis, Mr. Qadeer Ahmad Aziz examines the feasibility of applying machine learning approaches to address the problem of parts-of-speech (PoS) tagging for Pashto. He assumes that machine learning, or more specifically supervised learning methods, can achieve higher degrees of accuracy than rule-based methods for Pashto.

For this purpose, he first constructs a PoS annotated dataset and then trains two widely and adopted supervised algorithms, Support Vector Machine (SVM) and Conditional Random Field (CRF), on this dataset using various feature configurations.

Simultaneously, he discusses the challenges of PoS tagging in Pashto. As a result, he reports encouraging results: both CRF-based tagger and SVM-based tagger models surpass the currently existing rule-based approach for Pashto. However, the CRF model scores 96.6% f1-score, which is slightly higher than the SVM model with a 94.5% f1-score. Based on his knowledge, this work is the most comprehensive work for the Pashto PoS tagging to date. In his conclusion, he suggests that his work will facilitate advanced NLP research for Pashto in the future.

Mr. Ahmad Shoaib Joya

"A Transparent Cryptographic Layer for e-Document Management in the Afghan Administration."



Mr. Joya began by explaining the role of document management systems (DMSs) for e-government. He stated that e-government applications need to have a flexible, adaptable DMS that fits their governance processes and increases their efficiency and quality. He explained that many governmental institutions and business processes require digital documents with trusted signatures and protected content. Afghan Institutions use different information systems to scan, store, and retrieve documents, and some of these documents are confidential. Mr. Joya continued, explaining that his thesis developed one of three layers in a DMS that implements validation and cryptography on digital documents and avoids any additional efforts for the users in these processes. This cryptographic

layer is transparent to the user and uses Public Key Infrastructure (PKI) features to achieve Confidentiality, Integrity, Authenticity, and Non-repudiation to protect and validate digital documents.

Based on a literature review, he designed this layer to consist of ten interrelated components like a Private Certificate Authority (CA), a Certificate Revocation List (CRL), and Document Encryption. These employ different cryptographic techniques like Password-Based Encryption, Diffie-Hellman Key Agreement Protocol, Advanced Encryption Standard (AES), Counter (CTR) Mode Encryption, AES Key Wrapping Algorithm, Cryptographic Hash Function, and more.

Mr. Joya concluded by outlining how this transparent cryptographic layer allows for a flexible middleware that sits between the user interface and a storage backend. The storage backend could be local storage or cloud-based, and the user frontend could be a desktop or web application.

Ms. Azita Azimi

"On the Applicability of Data Mining Techniques to Incidence Reports on Violence Against Women in Afghanistan"



Miss Azimi first stated that according to research projects by the World Health Organization, 35 percent of women in the world had experienced at least one kind of violence. Violence has a negative impact on women's personal life, social life, academic life, and career. Therefore, many governmental and non-governmental organizations are working to reduce violence against women.

She continued that, as technology's applicability is increasing day by day, data mining is now being used in various contexts to find hidden patterns and valuable information. There are many research projects that show data mining is beneficial in the context of crime analysis, education, disease diagnosis, fraud detections, etc. As violence against women incidences is a crime or crime-like, her thesis investigates the potential of data mining to analyze the incidence reports of violence against women in Afghanistan. She mentioned that there were many problems due to the unstandardized data entry process, and she struggled with wrong spellings, typographical errors, presentation of the same information in various forms, mistakes in dates and ages values, and more inconsistencies in the dataset that caused the loss of a significant portion of the data while analyzing. Nonetheless, she used statistical methods to gain insight into the common types of violence, the number of reported cases in each province, the age range, and the numbers of cases in different months and years. Furthermore, she was able to find out who was the perpetrator of the violence using text mining techniques.

As a conclusion, she stated that by applying the principles of data mining on the available data, valuable insight into incidence reports had been gained, but for optimal results, better quality data with fewer inconsistencies is needed. To do so, it is necessary to standardize data entry in order to reduce inconsistencies in the dataset, allowing more advanced data mining techniques to be used.

A key to high-quality data, she emphasized, is professional software systems and skilled employees.

Ms. Faryal Noori

"A Data Mining Approach to Traffic Density Prediction: A Case Study of Kabul, Afghanistan"

Miss Noori began by introducing the global problem of traffic congestion and its consequences for human health. In Kabul, this issue is especially severe, as traffic is causing thousands of accidents a year and a large amount of air pollution. She explained that her research was trying to predict the amount of traffic on a specific route depending on factors like day-of-week, weather, etc. This prediction allows responding to the negative impacts of traffic congestion by allowing better planning both on an institutional and a personal level.



For her thesis, Miss Noori collected several months of real-time traffic data from Google's distance matrix API and the OpenWeather API, which were fed into a database and analyzed with KNIME. She showed how her analysis identified the busiest time in the week, Tuesday afternoon, and mentioned that she also analyzed the impact of local and religious holidays and weather conditions on traffic.

Miss Noori explained that the reduced traffic impacted her research at the beginning of the Coronavirus pandemic. It would be helpful to continue her research and assess the situation during the winter months when more weather effects are expected. In conclusion, she explained that her data showed some patterns interesting to city and traffic planners in Kabul, and it could be used as a blueprint for implementing data-driven city planning in Kabul.

Ms. Huma Ghani Zada

"Predicting the University Entrance Exam Performance of Afghan High School Students using Educational Data Mining."



Ms. Ghanizada began her presentation by outlining the university admission process in Afghanistan. Yearly, an average of 200,000 students from all 34 provinces of Afghanistan is eligible to participate in the Kankor examination. 61,863 out of 175,551 students passed this exam in 2019 and got placed at a public university.

Ms. Ghanizada explained that her research intended to find the correlation of the students' school performance, especially their last three-year transcript data, with their performance in the Kankor exam. To this end, she analyzed 164,304 student data records from the Kankor 2019 and 95,760 data records from the students' school transcripts of the last three years.

After an overview of how she cleaned, combined, and analyzed the data, Ms. Ghanizada explained that her findings showed some interesting results: Students' performance in school does not predict the Kankor performance that well. Many other factors are influencing the student's score in the Kankor. One factor might be that students take Kankor preparation courses to prepare for the Kankor exam. One another reason might be that since 2018, quotas based on gender and home province were introduced in some faculties, which leads to about 25 percent of the seats in some faculties being filled, not based on merit alone.

Ms. Ghanizada concluded that statistical analysis of student data and educational data mining should be an ongoing effort in Afghanistan to better assess the Kankur exam's efficacy to pick the most qualified candidates for the Afghan higher education system.

Ms. Marjila Rahmaty

"Analysis of Existing Learning Management Systems for the Requirements of Afghan Universities - A Case Study on Faryab University"

Ms. Rahmaty explained that her thesis analyzed the reasons for IT projects' failure in developing countries and focused on the barriers to a successful implementation of e-learning management systems at Afghan universities. Based on this analysis, she would create a concept for an e-learning system for Faryab University, which circumvents earlier implementations' pitfalls.

She surveyed students and teachers of Afghan universities to assess the failure of past projects and studied the literature on the common factors for failing IT projects in developing countries.

Ms. Rahmaty explained that her research shows that Afghan universities' use of e-learning systems and digital services has mostly failed shortly after implementation. Nonetheless, most students and users of those systems believe that it promotes learning.

Ms. Rahmaty based her draft of an e-learning system on a local solution that uses the available equipment in the universities and helps prevent the failure of the learning management systems, so it continues to be used by students and teachers alike.



Graduation event for Computer Science Master's students from Afghanistan

January 13th

Moderation:

Mrs. Agnieszka Zielinska, ZiiK at the TU Berlin

On January 13th, 2021, the official graduation event was held as an online video conference.

Mrs. Zielinska welcomed all guests on behalf of the ZiiK of TU Berlin: H.E. Rula Ghani, First Lady of Afghanistan, H.E. Prof. Dr. Abass Basir, Minister for Higher Education of Afghanistan, H.E. Mr. Yama Yari, Ambassador of the Islamic Republic of Afghanistan to Berlin, Mr. Nader Nadery, Chairman of the Independent Administrative Reform and Civil Service Commission, Mr. Markus Potzel, Special Representative for Afghanistan and Pakistan of the German Federal Foreign Office, Prof. Dr. Hans-Ulrich Hei, Vice President of TU Berlin, and Dr. Nazir Peroz.



She briefly introduced the schedule of the day and expressed her thanks to all guests for joining the event. She also thanked the program's funding partner, the Federal Foreign Office, for their ongoing support. Finally, she congratulated the graduates for their hard work and their success. She then gave the word to the Vice President of the TU Berlin, Prof. Dr. Hans-Ulrich Hei.

Prof. Dr. Hans-Ulrich Hei, Vice President of TU Berlin



On behalf of the TU Berlin government board and as a long-time supporter of the projects of the ZiiK, Prof. Dr. Hans-Ulrich Hei was delighted and honored to welcome all the excellencies, guests, and, most importantly, the 25 Master students. He pointed out their successful but stressful way of getting rich in terms of personal and cultural experiences. He acknowledged their competencies congratulated them for finishing their theses.

Prof. Hei continued with an overview of TU Berlin's history and explained how research and critical thinking on technologies in context with the impact on societies always have been a strength in TU Berlin's profile. Based on ethical and humanity questions, TU Berlin aimed to create an open intercultural atmosphere combined with focussing its research on engineering and technical science. This broad diversity makes TU Berlin well prepared for the fast development issues the world is asking for at the beginning of the twenty-first century.

Furthermore, he marked out global phenomena of change such as the covid-19 pandemic and climate change, which need to be solved globally. A tremendous change will come through the digital transformation linked with the pandemic, an area where the new graduates can consider

themselves now as experts. They will play a crucial part in developing their country and society, and Prof. Heiß wished them much success on their way.

In the end, he gave thanks to all excellencies, the presidential office, the civil service commission, the ministry of higher education, and all other people participating at this graduation. Special thanks went out to Dr. Nazir Peroz, who is already retired by the end of last year but is undoubtedly still available as an advisor and always the center of cooperation with Afghanistan. His vision that education is the key for development within a country lives on.

H.E. Rula Ghani, First Lady of Afghanistan



The First Lady of Afghanistan, H.E. Rula Ghani, opened her speech with warm, welcoming words for the distinguished participants and young graduates. She mentioned her joy about celebrating 25 young Afghans who just finished their computer science master's program that the technical university of Berlin and the Ziik organized for them. In particular, she named Dr. Peroz and thanked him for the relentless efforts he made in the last decades.

She spoke about her proudness for the graduates combined with expectations that Afghanistan now has on them as they have discovered the essentials of computer science, how wide its field is, and how important its role is in developing countries worldwide. H.E. Rula Ghani was kindly speaking about their newly achieved competencies that are required now in the country and that they shouldn't have any problems finding employment and being a part of the creation of a new system.

Besides that, her Excellency spoke about Germany's powerful character as one of the most advanced countries of our time. Especially in diversity political-wise, economically due to its forerunner role in the industrial production, socially because of its well organized and comprehensive social services and above all its flexibility in unexpected distresses by navigating the pandemic and minimizing the sorrows of the society.

In conclusion, she was proud to speak about establishing the foundations for aiming Afghanistan's ultimate goal – being a peaceful country.

Prof. Dr. Abass Basir, Minister of Higher Education in Afghanistan

Prof. Dr. Abass Basir first welcomed H.E. Rula Ghani, Prof. Dr. Heiß, the vice president of TU Berlin, all graduates, excellencies, and all participants. He congratulated the TU Berlin for its significant contribution by educating Afghan youth, already in the fifth generation. The TU Berlin and their teachers received congratulations, but the master's program students received compliments for their achievements. Generally, he mentioned the TU Berlin's efforts by graduating 100 afghans (soon: 125) master computer science students so far, which is a considerable development to progress Afghanistan.



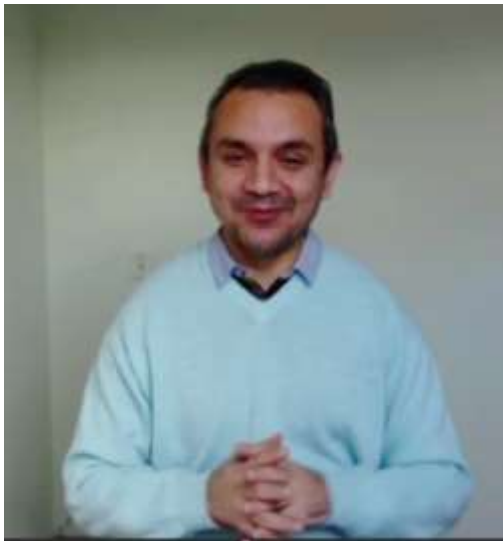
Germany's unique role, specifically the TU Berlin, played as the first founders for IT structures at Afghan universities and can only be underestimated. By illustrating the development of the IT structures, Prof. Dr. Abass Basir also pointed out some significant steps within this process, for example, the establishment of several IT centers in Afghanistan from 2003 on, the implementation of workshops, libraries, pc labs, and the establishment of the first IT computer center (ITCC) in Afghanistan that was built supposed to be a bridge between the academia and industry. Last but not least, he mentioned the master's program as a milestone in this history. Generally, he talked about the potential that technology has in order to revolutionize the traditional teaching and learning methods besides the effect of dramatically expansive access to long-life learning and the ability to change conceptions of higher education institutions in the future.

Prof. Dr. Abass Basir continued his speech with the changes that our ecosystem of education had to face due to the pandemic. The online courses were such a great response to the speed of the coronavirus. Therefore, Afghanistan established online platforms to ensure the quality of higher education. It was the countryside association that was delivering online courses throughout Afghanistan. A general priority of Afghanistan is establishing an online education anyways.

He highlighted the still growing role of TU Berlin in cooperation with Afghanistan, not only because of its excellent reputation within the whole country. The German university had built lots of trust throughout several visits over the past 19 years by organizing many IT conferences and alumni programs; therefore he is very much looking forward to working with TU Berlin.

Finally, he welcomed all the graduates and acknowledged the critical role that they will play in Afghanistan and its transition towards digitalization. Moreover, he thanked the federal foreign office of Germany, TU Berlin's leadership, the ZiiK team, particularly Dr. Nazir Peroz, and all the Ministry of Higher Education partners for their support and requests.

Mr. Nader Nadery, Chairman of the Independent Administrative Reform and Civil Service Commission



Mr. Nader Nadery commenced by welcoming H.E. Rula Ghani, First Lady of Afghanistan, Prof. Dr. Abass Basir, Minister of Higher Education in Afghanistan, Yama Yari, Ambassador of the Embassy of the Islamic Republic of Afghanistan in Berlin, Markus Potzel, Representative of the German Federal Foreign Office, particularly Dr. Peroz as a role model to many students participating in the previous generations and by congratulation the students themselves.

First, he addressed the graduated master students as they gained a lot of knowledge in Germany and an exceptional and unique opportunity in a lifetime that just a few get a chance to. He mentioned the responsibility the students now have by giving something back to the Afghan society. As the president of the republic just launched government programs and made investments where the students' expertise is enormously needed, they can help the country. In combination with the previous generations, he got faith for a more developed future for Afghanistan.

Furthermore, he expressed his happiness in the name of the civil service commission that they joined hand with Dr. Peroz three years ago by ensuring that institutions and the government benefit from the expertise being built at the master's program. He outlined the civil service's excellent development, which opens students' space to join these institutions, either they're already familiar or new to them.

In the end, he thanked the federal foreign office of Germany, Markus Potzel, Representative of the German Federal Foreign Office, the TU Berlin, and Dr. Peroz.

Mr. Markus Potzel, Representative of the German Federal Foreign Office & Special Representative for Afghanistan and Pakistan

Mr. Potzel opened his speech by thanking everyone for the invitation to the graduation ceremony of the fifth generation of Afghan students studying for their master's degree in computer science at TU Berlin. He pointed out how celebrating the students' achievements is remarkable, especially during these difficult times.

Mr. Potzel continued by highlighting the complex nature of computer science and how this can motivate the now highly qualified students to positively affect Afghanistan's future as a modern and peaceful country. He remarked that education is a prerequisite for building and sustaining peace. He wishes that the graduates of this generation, together with former generations' graduates, will help rebuild a new Afghanistan.



He outlined the substantial funding from Germany to support programs, including training of IT administrators, building IT centers, and the master's programs to give support within times of conflict in Afghanistan. Therefore, he gave special thanks to Dr. Nazir Peroz for establishing ZiiK, which he sees not only as an educational program but also as a contributor to strengthening Germany and Afghanistan's friendship. He finished his speech by addressing the graduates and ensuring them of ongoing support on the German government's side.

H.E. Mr. Yama Yari, Ambassador of the Embassy of the Islamic Republic of Afghanistan to Berlin

His Excellency outlined the necessity of Afghanistan catching up with their educational infrastructure, primarily focusing on establishing IT systems. He thanked not only the ZiiK and the Technical University, but also the German Federal Foreign Office and the German Academic Exchange Service for their support in educating new generations of IT specialists who in the past have already helped in developing ideas for IT improvements in Afghanistan, such as building a technology hub to enable others to work together, sharing ideas or linking with investors and companies from the west.



He closed his speech on a positive note, referencing further cooperation with Germany while also highlighting the importance of refocusing the programme to fit the country's future needs.

Mr. Daniel Tippmann, Head of ZiiK at the TU Berlin

History of the Afghanistan project of the ZiiK of TU Berlin



In his speech, Mr. Tippmann presented a brief overview of the Afghanistan project of the ZiiK of TU Berlin since 2002. It all began with establishing an IT Center at Kabul University (ITCK), followed by IT Centers at four further Afghan universities. The main focus of ZiiK's projects in Afghanistan, however, as he explained, is on vocational training and academic education.

In 2004, as he went on, a computer science BSc study program was established at Herat University, for which teams of the ZiiK of TU Berlin traveled to Herat not only to support the setup of the first computer science faculty in Afghanistan but also to conduct education and support of students for several semesters.

Another milestone project of the ZiiK that Mr. Tippmann presented is the computer science Master's program for Afghan students at TU Berlin. In this study program, IT experts are educated for Afghan universities and public institutions based on a demand-driven curriculum that considers the situation and particular needs in Afghanistan. Mr. Tippmann emphasized that with the current generation of participants, a total of 125 computer science academics and IT professionals will be

available for Afghanistan, which are highly needed for the establishment and extension of academic structures in the area of IT in the country.

With its projects, as Mr. Tippmann finished his speech, the ZiiK wishes to help Afghanistan become a member of the international scientific community and strengthen human capacities in the area of IT. With a thorough education, the talented youth of Afghanistan will provide peace, stability, and wealth and connect the country to the global information society.

The ZiiK is ready, as Mr. Tippmann stated, to further support Afghan authorities, universities, and institutions in the future. It is also the plan to continue the computer science Master's program and the Ph.D. program so that further qualified IT experts will become available to the country for academic education and research.

Mr. Said Jawad Saidi

Experiences of returning to Afghanistan after completing a Master's degree at the TU Berlin

Mr. Said Jawad Saidi spoke as a representative of Mr. Masood Latif Rai, Minister of Communication and IT in Afghanistan, as he was on a business trip that day. Mr. Saidi is a graduate of the computer science Master's program and currently a Ph.D. student.



He congratulated this year's graduates and outlined several different IT projects that the students can join after returning to Afghanistan.

Mr. Saidi was eager to present potential future work opportunities, including the cybersecurity agenda for the government, expanding the Government IT structures, using their expertise in advising the Ministry of Communication and IT, digitalizing the health sector, or working with universities to educate further generations of IT students in Afghanistan.

Listing all the opportunities, he presented the diversity of employment possibilities in Afghanistan and wished all degree holders the best for their coming future. He finished by thanking all contributors to the program for making it possible and the ZiiK of TU Berlin for the support.

Ms. Azita Azimi and Mr. Mohammad Khalid Sediqi, student representatives

Résumé of the study visit in Berlin



Last but not least, Ms. Azita Azimi and Mr. Khalid Sediqi, both spokespersons of this 5th generation of the Master's program, presented a résumé on their stay in Berlin. They thanked all guests for joining this event and for having the opportunity to talk on behalf of their colleagues.

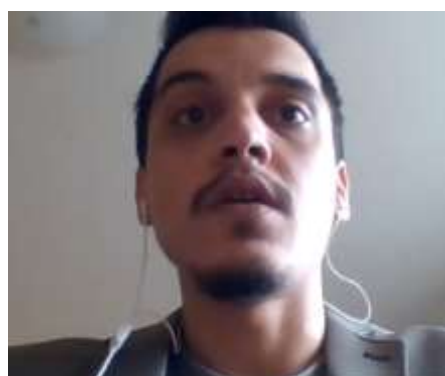
Ms. Azimi started by summarizing the different phases of the project from her point of view. It all started with the selection process at the ITCC Afghanistan in 2018 in Kabul. Over 560 persons applied for the program, and 100 of them were eligible for the entrance exams. After a series of written tests in maths, computer science,

logical thinking, problem-solving and English, and individual interviews, the best 25 students were chosen as recipients of the TU Berlin scholarships. Before the group could travel to Berlin, all participants needed to fly to India to apply for the German visas. After a two-week stay in New Delhi, these visas were issued, and the group could travel to Berlin and settle into the student apartments provided by the TU Berlin team.

The first three months were dominated by the preparation courses and a cultural program to know the new surroundings. Beginning of 2019, the group finally started with their regular master's studies, which was accompanied by a cultural program. Besides getting to know German culture and history in Berlin and other locations in Germany, part of this cultural program was a field trip to Italy, where the group gained valuable experiences in European culture and history.

Ms. Azimi reported that during her studies, she was offered a broad range of classes, and the students got to connect with German and other international students and quickly could adapt to the new culture.

Next, Mr. Khalid Sediqi started by explaining the application projects at Afghan institutions, which were part of the study program. He highlighted that at the end of the application projects, the group had the honor to present the results to H.E. the First Lady of Afghanistan, Mrs. Rula Ghani, in Kabul. After that phase and the return to Berlin, the students started to work on their master's theses. While it was initially planned to finish the entire program until September 2020, the Covid-19 pandemic led to an extension of four months and this graduation event in January 2021. Mr. Sediqi then used the chance to thank the team of the ZiiK at the TU Berlin and all other stakeholders again. He closed his speech by kindly requesting an appointment with H.E., the First Lady, for the entire group after returning to Kabul end of January.



He expressed his hope for future generations of young Afghans to get the chance also to join this study program. Also, it would be of great benefit to take part in a PhD program at TU Berlin.

photos and screenshots



Attachment 1

Pictures of the various conferences

Pictures of the various conferences





























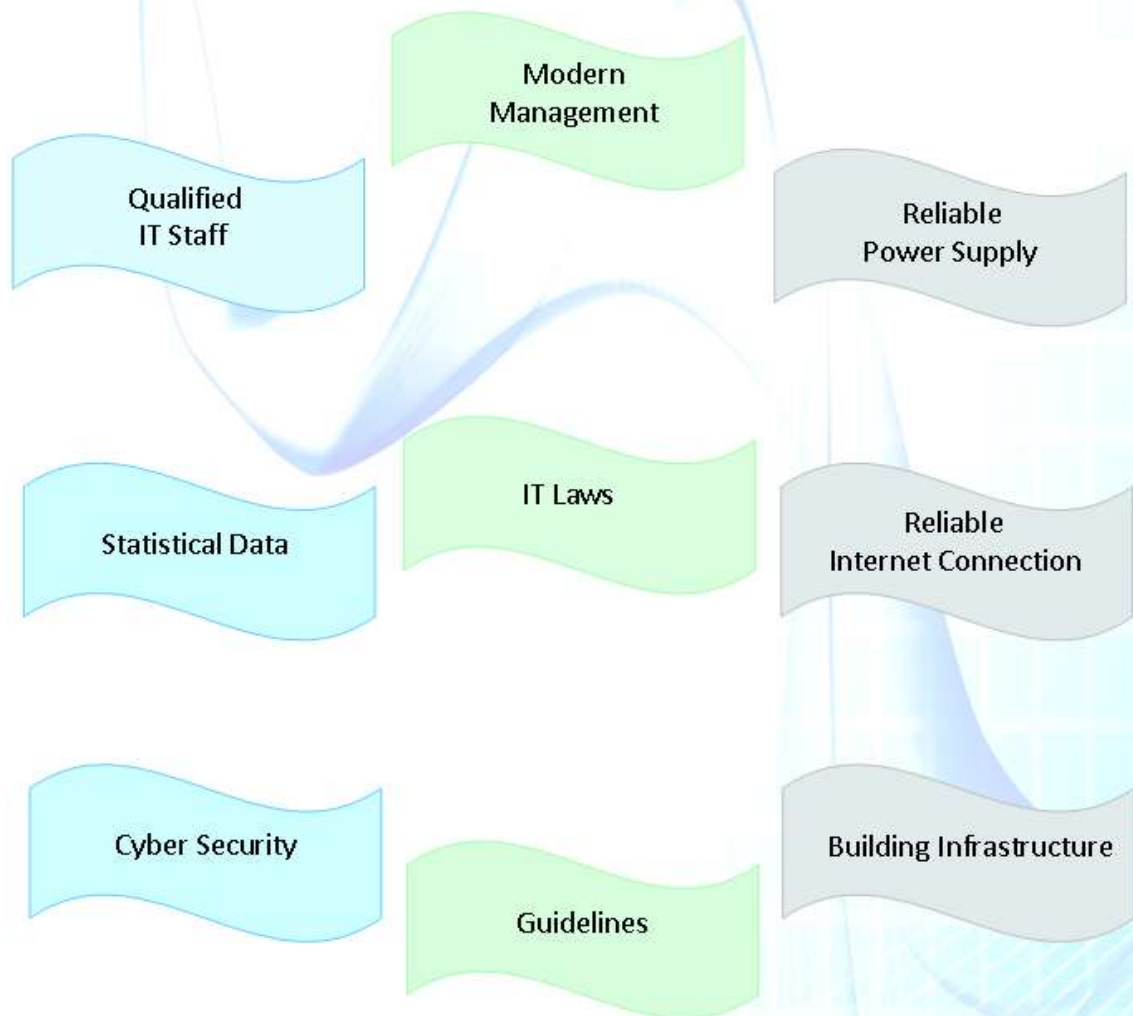
Attachment 2
Digital Strategy Afghanistan 2020



Digital Strategy Afghanistan 2020

Dr. Nazir Peroz
February 2019

Basic requirements of the Digital Strategy



1. Preface

Technological progress is the driver of the Afghan economy, science and society. However, this progress is depending on **basic requirements or basic components** like qualified IT professionals, reliable IT infrastructures (power and internet supply, building services engineering etc.), modern management structures, IT laws and policies, comprehensive and thorough demographic data and statistic information about Afghanistan, as well as available funding. Through digitization, modern technologies today are creating a globalized, intelligent, information-based, highly productive and interconnected world. In the long-term, they are shaping the economy and science, the labor market on both large and small scales, as well as communication among the people.

Now, the questions are: What does Afghanistan want to gain from this technological development? Which role does Afghanistan want to play in a digitized and globalized future? How can Afghanistan secure and strengthen its economic and scientific location through digitization? Which requirements have to be met for a stable, secure and effective digital landscape?

During the 14th IT Conference about an "IT Strategic Plan for Afghanistan" from December 17th until 19th, 2018, at the MoHE, the speakers from the MoCIT, MoHE and MoE, as well as from ATRA, CSO, ATVE and from Afghan universities discussed with the conference participants about the progress in IT that Afghanistan has made recently, and also about the deficits and challenges which are still to take. It is still an issue that there are currently only few institutions which have qualified IT professionals, operational and secure IT infrastructures, IT systems and networks, and in most cases, isolated IT solutions are implemented. Such developments and bad planning lead to

- high costs for troubleshooting and debugging,
- violation of privacy, availability and integrity of data and information,
- harm for the future economic and scientific location, and
- dependencies on other countries and falling behind innovative developments of digitization.

Experiences from other countries show that the aforementioned basic requirements for a successful digitization have to be implemented first. This will then form the foundation for an effective use and development of IT systems, algorithms, big data, artificial intelligence, mobile devices, and applications in areas such as e-government, e-commerce, e-health, e-education, cloud services etc.

The proposed "Digital Strategy Afghanistan" was initiated by H.E. President Dr. Ghani and the topic was discussed in detail at the 14th IT Conference from December 17th to 19th, 2018. This proposal first recommends measures for particular basic requirements, which will be conceptually expanded and further specified with the responsible institutions by the end of 2020. The combination of these particular developed concepts then promotes a sustainable digital development which supports the political, social and economic fields of action for the future of the country.

2. Digital Strategy 2020

Society and politics are facing the important task to harness a revolutionary technical development for social and economic progress in Afghanistan. To achieve this, Afghanistan needs to prepare itself for the path to a digital society. As a comprehensive transformation process, digitization has an enormous potential for the country. The future competitiveness of Afghanistan in Central Asia, preservation of its culture, increase of wealth as well as quality of life of its citizens will increasingly depend on how successful this potential will be used for the good of all.

Afghanistan used to be an agricultural country rather than a center of industrial development and has thus not yet benefited from modern technologies. Now it has a chance to actively contribute to the development of the digital transformation. This is not only to reconnect the country to the global community and to make use of digital products, but rather to make it a pioneer of digitization in the area through an innovative digital economy.

It is the task at hand to prepare and plan a successful development of Afghanistan in the digital age within the scope of the Digital Strategy 2020. The preconditions are excellent: Afghanistan is a young society with a talented and ambitious youth. To make use of this opportunity and to successfully meet today's challenges, strategic goals have to be determined which secure a nation-wide effective, efficient, secure, and sustainable IT supply.

Only with a successful interaction of the basic requirements and an effective development process for the Digital Strategy Afghanistan 2020 and the resulting measures can a sustainable development be achieved. The relevance of digitization for Afghanistan and the resulting advantages are numerous. A balance of economic, social, and ecological aspects of sustainability is to be strived for, so that Afghanistan becomes a pioneer of digitization in Central Asia in the fields of intelligent, resource-friendly, and climate-friendly technologies and that an extensive decoupling of growth and resource consumption can be reached.

2.1 Strategic Goals

The potential of digitization has to be understood as the following **innovative and sustainable strategic goals** for the country:

- Accurate data about available and missing resources is being collected and evaluated statistically.
- Afghanistan is not only using products of digitization, but rather develops and designs them itself.
- Afghanistan has to strive to develop creative and innovative solutions for the digital age.
- In the field of digitization, Afghanistan has to become an innovative region within Central Asia.
- Digital education programs will make Afghanistan an attractive IT location in the future.
- Afghanistan develops its IT infrastructure in a secure and sustainable manner, e.g. through the construction of decentralized power plants on the basis of renewable energies, and the establishment of a nation-wide research, education and government network.
- Modernization of the administration of institutions is a central task. The required areas like education, management, legislation, infrastructure and funding in both cities and rural areas have to be developed and reformed in a future-oriented and sustainable way.
- Data protection, privacy and sovereignty of the institutions and citizens have to be provided for by respective laws and regulations.

- Cooperations with national and international partners have to be established wherever useful. Interdisciplinary competence teams have to be founded.
- Implementation of the IT Strategy Plan and its measures have to be continuously monitored and supervised in order to get the most out of it for the state, its institutions and citizens.

To successfully achieve these strategic goals, measures are necessary for the particular basic requirements of the Digital Strategy Afghanistan 2020 like comprehensive demographic data and statistic information about Afghanistan, a nation-wide digital education, reliable infrastructure (stable power supply and Internet connectivity, stable building services engineering), modern administrative structures and management, cyber security, IT legislation and policies as well as sufficient funding.

3. Basic elements of the „Digital Strategy Afghanistan 2020“

Digital development is not only a technological questions but rather a challenge to be addressed by the whole of society. This has to be considered during the development of the Digital Strategy Afghanistan until end of 2020. The future economic, ecologic and social issues depend on the following basic elements. The proposed respective measures are making no claim to be exhaustive.

3.1 Collection of statistical data

In general, data collection is a process to register information to be used for documentation or analysis of processes. It leads to new insights and allows for informed decisions.

Data of optimal quality are, today more than ever, the fundament for outstanding services and products. Statistical data and information allow for a neutral valuation of conditions and processes, to learn from mistakes of the past and are required for an estimation of future developments. Digitized processes need valid data. They are a pre-requisite for digital development and the location of Afghanistan. Missing or faulty data are impeding processes and entailing unnecessary efforts.

In this context, it is paramount to provide statistical data and information to politics, administration, economy as well as the citizens. This data has to be objective, independent and of high quality.

Measures

- Data and information are being collected in a flexible and efficient way
- Data is methodically and technically prepared
- Data is collected and processed
- Laws are adopted for data collection
- Staff receive education and further trainings to improve their qualification
- Consistent quality standards and policies are established for collecting and processing of statistical data
- Internationally applied methods are being analyzed and adapted for Afghanistan
- Statistics and data on demography, public health, economy, agriculture, education, population, life expectancy, transport, residency, social affairs, energy supply, media, sports, unemployment etc. are released on a semi-annual basis
- Digitization is being used for the collection, registration and archiving of data
-

Implementation

All measures are to be developed in cooperation with responsible institutions within the scope of a concept until the end of 2020.

3.2 Digital Education

Digitization covers school, professional, and academic education.

For **school education**, teaching and learning in the digital world needs to follow the primacy of pedagogics. I.e. digital change has to be considered so that the goal to develop future educational guidelines and to strengthen independence can be reached. For this, learning processes need to be designed in terms of content and form to help unfold individual potentials through inclusive education, and also through the use of digital learning environments.

Due to the proximity to the employment system and as a partner of dual training, **vocational training** is particularly and immediately affected by technological and economic change through digitization. As a preparation for today's and future requirements of labor, new industries like information technology, computer technology, radio and telecommunication technologies, office and communication technologies, media and print technologies, knowledge management, smart handicraft, digital construction, etc. have to be considered in the syllabi.

Following the didactic principle of practical relevance, developments in the working world caused by the ongoing digitization have to be included in teaching at vocational schools in a timely manner. Teaching goal is more and more the acquisition of competence to use digital work equipment and techniques. Besides insights into digital processes, the indirect consequences on the ongoing digitization have to be considered, e.g. for organization of work processes and communication with globally networked production, supply and delivery chains.

Digitization describes a fundamental change in the distribution of data, information and knowledge. In this regard, **academic education** has a twofold responsibility: On the one hand, universities are the place where technologic innovations pushing the digital change are being researched on and developed. On the other hand, this knowledge about digital processes and their consequences is being distributed there. Furthermore, digitization provides new and innovative means of knowledge transfer for the universities, which not only focus on digitization as object of research, but can enrich all teaching content of the various disciplines in varying degrees.

In that sense, universities have to be developed as places of development, trial, and application of forms and methods of digital education as well as for research on individual and societal consequences of digitization.

IT location, growth, top-quality IT products and services, as well as employment will become possible if all areas of education: school, vocational and academic, will be **developed** and **reformed** sustainably and intensively in the digital world through a new **educational strategy**. In the long-term, this will enable e.g. the development of a semiconductor and software industries on an international level, sustainable e-waste recycling, etc.

Measures

- Digital media will be employed at schools, vocational schools and universities in a target-oriented way.
- IT equipment like PC labs and Internet connectivity at schools, vocational schools and universities will be expanded and supported.
- Self-management and self-organization capacities are being supported.
- International thinking and acting is fostered.
- Competencies will be acquired:
 - Searching, processing and storing

- Communication and cooperation
- Manufacturing and presenting
- Protecting and acting securely
- Problem-solving
- Analyzing and reflecting
- Critical attitudes to digital media and the consequences of digitization for the living environment and the world of work
- Education and further training of lectures will be increased
- Education portals for teaching staff will be established
- Open education resources with open licenses will be supported instead of commercial platforms
- Didactic concepts will be developed to be used by the teaching staff (didactics before technology? Didactics thanks to technology!)
- Consistent norms for degrees and teaching content will be implemented in order to comply with national and international standards
- Quality of teaching will be improved through motivation and pedagogic competence
- Brain drain is being countered through innovative ideas and increased salaries
- Quality of teaching will be centrally supervised by a control committee
- Media-didactic and educational concepts will be engaged to sensitize people for new developments and changes caused by digitization and to increase media competence.
- Through excellent education programs, talented youth is to be supported and national IT top talent programs established
- Digital forms of teaching will enable and support lifelong learning
- Research, development and innovation at the universities will support processes of digitization
- Digital research centers will be established
- Partnerships with top universities world-wide will be established
- Society will be prepared for cultural and structural changes by tailored educational offers
- Self-knowledge and good leadership are a pre-requisite for successful change processes
- De-centralization of the Kankor will be expedited
- New course offerings will help meeting the digital challenges of the labor market
- All populations will be included through a digital education reform
- Chances and requirements will be considered in curricula development
- Use and development of open source software is being supported
- Start-ups are supported as a driver of digitization
- Online trainings are considered as a tool and not as a replacement
- Responsibilities have to be determined
-

Implementation

Respective concepts for all areas of education (schools, vocational schools and universities) are being developed in cooperation with responsible institutions until the end of 2020.

3.3 Infrastructure

In this context, infrastructure means reliable power supply, Internet connectivity, and building services engineering:

3.3.1 Power supply

Electricity is required, no matter if working on a PC, notebook, tablet computer, or smartphone. The dependency of a digitized society from energy supply – especially electricity – is enormous. Short blackouts or even longer power outages can have dramatic consequences for IT systems. When mission-critical systems are affected, this also disrupts public order and security. Besides blackouts, other disruptions can also threaten its operation, e.g. over- or undervoltages can lead to malfunctions or even damages to electronic equipment.

Measures

- Nationwide electricity supply and connection to the power grid
- Power generation from ecologic and regenerative sources is to be extended in order to establish an independent and sustainable power supply:
 - Promotion and extension of solar plants
 - Promotion and extension of wind power plants
 - Repair and extension of hydroelectric power plants
 - Foster research on geothermal systems
- Supporting further training of staff
- Responsibilities have to be determined
-

Implementation

A thorough plan is to be developed until the end of 2020 in cooperation with responsible institutions which secures 100% of the consumed electricity in Afghanistan from renewable energies.

3.3.2 Internet supply

The internet is providing the infrastructure for transferring data and information in the digital age. Benefits for consumers are being created in form of various services on the basis of this infrastructure. Unfortunately, these services are not yet reliable and secure, and the connection quality is often poor. Broadband connectivity in Afghanistan is far from being ubiquitous, cheap, fast, and secure, particularly in rural areas, where most of the population resides.

Also, there are no politic frameworks and policies yet for the technical implementation and for access regulations, network neutrality, privacy etc. Reliable infrastructures and legal regulations are crucial for the development of a digital economy as well as end users.

Measures

- Fiber optic connections are being extended in a profound and target-oriented way
- Satellite connections are being evaluated and supported, where required
- Wireless connections are being evaluated and supported, where required
- The extension of the network infrastructure is being supervised by qualified professional staff
- Guidelines for the extension of the network infrastructure are being developed and enforced
- Development and extension of the public network infrastructure is being nationally subsidized
- Public wifi hotspots are being established
- Mobile Internet connectivity is being nationally subsidized
- Access to network infrastructure is being supported both technically and politically
- A reliable, nation-wide backbone network is to be established and operated
- A central national Internet hub (Afghanistan Commercial Internet Exchange, AFCIX) will be established
- Peering agreements are being made with neighboring states. On this foundation, network providers can offer economic Internet access for companies and private customers
- Responsibilities have to be determined
-

Implementation

A sustainable concept for a reliable, secure and affordable Internet supply is to be developed in cooperation with responsible institutions until the end of 2020.

3.3.3 Building services engineering

Buildings and building services engineering are a pre-requisite for the operation of IT systems, work spaces, etc. Buildings need to provide reliable external protection for this. Only buildings with a respective infrastructure allow for an operation of IT services and digital processes. For this, components of the building itself need to be considered, i.e. walls, floors and ceilings, roof, windows and doors, as well as building service engineering like power and water supply, gas, heating, network etc.

Measures

- Buildings and rooms (PC labs, server rooms etc.) are to be enhanced as secure locations for electric equipment
- Fire prevention equipment is being installed
- Employees and institutions are being sensitized for fire and hazard prevention
- Clear policies are being established for fire protection
- Climate control and air conditioning systems are being installed in rooms with sensitive equipment
- Respective protective measures are being implemented in building sections subjected to dust
- Lightning conductors, sufficiently dimensioned power lines and network cables are being installed to reduce risks of lightning damage
- Damages caused by wrong construction or improper extension of buildings are being corrected and prevention measures taken

- Staff is being trained
- Theft protection measures are being implemented
- Access control and security zones are being established
- Responsibilities have to be determined
-

Implementation

A sustainable respective concept is to be developed in cooperation with responsible institutions until the end of 2020.

3.4 Modern administrative structures and management

Data and information are important values for institutions and thus have to be organized and managed appropriately. Today, most information and data are at least in part being created, stored, transferred and processed by IT systems.

To push digitization, a public administration is required which questions complex processes and extends its electronic systems and networks. Online processes must be accessible for anyone. In the future, institutions, corporations and citizens have to be enabled to manage their administrative affairs electronically and in a secure way. Investments in a well-structured management system not only lead to improved and more efficient services for the citizens and more transparent processes, but are also more cost-efficient and help get rid of corruption. Positive side-effects are an increase in quality of work and trust, an optimization of the IT landscape and of organizational processes, as well as synergy effects through better integration of the management into existing structures.

Measures

Effective management structures for digitization require the following aspects:

- Tasks and responsibilities are being determined
- Legal foundations are being developed
- In the long-term, institutions detach themselves from non-governmental organizations (NGOs)
- Scopes for action are broadened and financial resources provided in correspondence with procurement policies and administrative units
- In addition to existing structures, a corruption reporting office is being established
- Salary and compensation structures are adapted according to supply and demand
- Education and further training programs for staff members are supported
- A culture of protocol and documentation is being created
- All IT projects are being monitored and strictly supervised
- Responsibilities have to be determined
-

Implementation

A respective concept for this area is to be developed in cooperation with responsible institutions until the end of 2020.

3.5 Cyber Security

Through the ongoing digitization, topics like trustworthiness, security of IT systems, dependency on IT in many spheres (critical infrastructure, Internet of Things, Industry 4.0, smart technologies etc.) are increasingly important, also in Afghanistan. This includes debates about espionage and surveillance, cyber crime, cyber warfare. All these require for thorough cyber security measures.

For a successful digitization, a secure operation of IT systems and services is indispensable in order to establish the necessary trust.

Measures

- An effective IT security management system is being developed
- IT security processes are being initiated
- Responsibilities are taken on
- An IT security concept is being developed
- Risk assessment procedures are being defined
- An authority for security in Information Technology is established in Afghanistan
- Cyber attacks on government networks are being detected and countered
- IT security standards are being observed
- Existing IT competences are being expanded through targeted qualified training programs
- Responsibilities have to be determined
-

Implementation

The already available concept "IT Security Strategy Plan for Afghanistan: Setting up an Authority for Security in IT" from September 2017 is being implemented.

3.6 IT laws

Establishing and enforcing legal foundations for IT fosters the development, use and extension of IT structures, as otherwise, there would be no means against abuse. There are currently no specific IT laws in the Afghan legislation.

Measures

The following measures are to be implemented:

- IT and cyber security laws on the basis of the Afghan legislation are being passed
- Effective means for the implementation of IT laws are created
- Cyber security policies are being developed
- Consistent legislation in the field of data protection and privacy is created
- Responsibilities are determined, activity reports prepared and control mechanisms established
- The following pillars of IT legislation are being implemented in Afghanistan:
 - IT contract laws
 - E-commerce laws
 - Intellectual property laws

- Data protection and privacy
- Communication and services regulations
- Public contracting of IT services
- International affairs
- Features of criminal law and process management
- Responsibilities have to be determined
-

Implementation

Respective IT laws are to be developed in cooperation with responsible institutions until the end of 2020.

3.7 IT policies

In addition to the IT legislation, various IT policies are to be introduced as technical implementing provisions. If and for whom a policy has a binding effect depends on the application and the acknowledgement of the issuing institutions.

Altogether, there is a multitude of IT policies which cannot all be listed here in detail. Instead, a number of representative IT fields which require the development of policies are going to be presented here briefly.

3.7.1 Policies for IT projects

Projects play an important role in all IT areas, as basically every enterprise, be it maintenance, installation or implementation of a service, can be formulated as a project. Oftentimes, such enterprises are not called a project but nevertheless have project-like properties. A project can roughly be divided into three phases: Planning, implementation and finalization. All three phases require particular policies.

3.7.2 Policies for IT systems

IT systems are technical facilities for information processing and form self-contained functional units. Examples are servers, clients, firewalls, router, switches as well as mobile devices. These form the core of modern Information Technology and require respective policies.

3.7.3 Policies for IT networks

Information and data are being transferred through a computer network. This also allows for distributed applications. A number of networks types exist, e.g. local network (LAN), virtual private network (VPN), wireless networks (WLAN), each of which need to be regulated by corresponding policies.

3.7.4 Policies for applications

An application is a software on a computer which provides one or more functionalities to the user. Thus, applications are an interface between the user and the system.

Clear structures for the use of applications are required, in particular, for the following: Installation, de-installation and updates, selection of software solutions, security certificates etc., but also rules for a secure and safe use of the WWW, Email and other Internet services.

3.7.5 Policies for users

IT at work brings certain requirements for the personnel and the organization in order to ensure an effective and secure handling of the technology. Misconduct of users can lead to major damage to the institution. Thus, IT policies for users are required to regulate responsibilities, hiring of new staff, authorization, staff leaving the organization, password management, mobile data media, etc.

3.7.6 Policies for license management

The acquisition and management of required software licenses within an institutions has to be regulated by respective policies. These have to also include guidelines and recommendations for whether Open Source¹ or commercial software is to be used.

3.7.7 Policies for emergency management

Failure of IT systems can cause great damages, as it can degrade operability of an institution, or even bring down the entire IT structure. Such events can lead to enormous financial losses. To prevent such failures and minimize the impacts, and to re-establish normal operation as quickly as possible in an emergency, policies for emergency management are crucial.

3.7.8 Policies for Cloud Computing

Cloud Computing describes the provision of IT infrastructures like storage space, computing power, or applications as a service over the Internet. These services are accessed solely via technical interfaces and protocols, e.g. a web browser. This has a high savings potential compared to locally operated and maintained IT systems.

On the other side, this outsourcing of data or applications to a public cloud bears a number of associated risks. These data or applications are being relocated to a service provider and are thus

¹ Open Source software can be used as an economic solution for IT infrastructures. On top of that, it offers a number of further advantages, especially for public institutions.

beyond control of the institution. Furthermore, policies and guidelines like e.g. data protection or privacy policies can be violated if sensitive data are transferred to a public host.

Therefore, the use of cloud computer services has to be clearly regulated in respective policies.

3.7.9 Policies for IT security

Effective and secure IT processes are a central basis for the performance of an institution. IT operations increasingly demand for an integration of procedures and processes which are relying on the features of the IT systems. As a consequence, integrity, privacy and availability of data, applications and services have to be absolutely guaranteed.

Under such conditions, IT security is of fundamental and strategic relevance, for which the development and implementation of a consistent policy for IT security is required.

Implementation

Respective policies for all IT areas are to be developed in cooperation with responsible institutions until the end of 2020.

4. Summary

In today's digital age, active political shaping on the basis of a coherent digital strategy is required in Afghanistan as urgently as never before. This will push forward digital change in a profound, holistic and target-oriented way. This proposed strategy creates an effective, secure, and sustainable foundation for the basic requirements of digitization. This will later on enable Afghanistan to make use of the numerous opportunities of digitization in various areas of life and work, like e-government, e-commerce, e-health, e-education, big data, cloud services, artificial intelligence, Internet of Things, Industry 4.0, smart technologies, etc.

Afghanistan shall not only blindly use the products of digitization, but rather enable itself through digital education programs to contribute to the development of digital processes and become a competitive player in Central Asia. Eventually, this is going to strengthen its national sovereignty and security.

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