National ICT Sector and Policy Appraisal Report

UKRAINE

December 2010

SCUBE ICT

GATEWAY TO UKRAINIAN & BELARUSIAN ICT RESEARCH

Member of the
Eastern Europe and Central Asia cluster
www.eeca-ict.eu

Funded by the European Commission
under the Information and
Communication Technologies (ICT) theme

This report has been developed under the **FP7 SCUBE-ICT** project (www.scube-ict.eu) by the following group of specialists:

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PREFACE

The present document has been elaborated under the joint efforts of the SCUBE-ICT project consortium.

SCUBE-ICT is an innovative EU funded initiative aiming to upgrade the cooperation in the field of Information and Communication Technologies (ICT) between EU, Belarus and Ukraine in key areas of mutual interest in order to create substantial socio-economic benefits in all three regions. A wide range of diversified activities will be implemented at two levels:

Research / industrial level

- ✓ Analyse the Belarusian and Ukrainian research and industrial ICT domain,
- ✓ Create a 'pool' of key ICT players from Belarus and Ukraine to promote collaboration with their EU counterparts.
- ✓ Advice and consult highly motivated ICT actors from the three regions and support their collaboration under FP7-ICT research activities.

Policy level

- ✓ Identify and analyse existing and future commonalities and differences in ICT R&D policies between EU and the targeted countries.
- ✓ Support and facilitate policy dialogue towards future cooperation directions in the ICT Research and Development field.

SCUBE-ICT identity

Title:	*"**Strategic Cooperation in Ukraine, Belarus and EU in Information and Communication Technologies**" (Contract No 231148)*
Duration:	*January 1, 2009 – December 31, 2010 (24 months)*
Website:	*http://www.scube-ict.eu*
Coordinator:	*International Environment and Quality Services North Greece Ltd (Q-PLAN N.G., Greece, www.qplanng.gr) -*
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Consortium	

The project was implemented by a multidisciplinary and multicultural consortium of 10 partners, 4 from EU-27 and 6 from Belarus and Ukraine:

- **International Environment and Quality Services North Greece Ltd**
  Q-PLAN N.G., Greece, www.qplanng.gr
- **Intelligentsia Consultants Ltd**
  Intelligentsia, UK, www.intelligentsia-consultants.com
- **ALTEC SA Information and Communication Systems**
  ALTEC, Greece, www.altec.gr
- **Technical University of Catalonia**
  UPC, Spain, www.upc.edu
- **Belarusian Institute of Systems Analysis and Information Support of Scientific and Technical Sphere**
  BELISA, Belarus, www.belisa.org.by
- **United Institute of Informatics Problems of the National Academy of Sciences of Belarus**
  UIIP-NASB, Belarus, www.uiip.bas-net.by
- **Belarusian State University of Informatics and Radioelectronics**
  BSUIR, Belarus, www.bsuir.by
- **Lviv Centre of Scientific, Technical and Economic Information**
  LvCSTEI, Ukraine, www.cstei.lviv.ua
- **V.M. Glushkov Institute of Cybernetics of National Academy of Sciences of Ukraine**
  GIC, Ukraine, www.icyb.kiev.ua
- **Institute of Artificial Intelligence Problems**
  IAIP, Ukraine, www.iai.gov.ua

Table of Contents

Introduction

The present document has been elaborated under the SCUBE-ICT project and is a part of the **deliverable D2.1** "***National ICT Sector and Policy Appraisal Report"*** for the case of ***Ukraine***. It reviews the national ICT policies and priorities and it identifies socio-economic factors influencing the ICT sector in Ukraine, providing a summary of the current status and trends of Ukrainian ICT sector. It identifies the *strengths* and *weaknesses* of the ICT sector of Ukraine at both research and business levels, while highlights *emerging opportunities* and *potential threats* for the development of the ICT sector. Furthermore, it briefly outlines existing collaborations between Ukrainian and EU-based organisations in several ICT fields involving either private organisations or public research institutions. Finally, it concludes with a set of preliminary Policy recommendations to support future ICT co-operation with the EU.

The document is structured into the following chapters:

- **Chapter 1** summarises the *structure and status* of the National ICT sector and its governance system.
- **Chapter 2** provides an overview of the *main trends* in the Ukrainian ICT Sector as well as the National Policy Objectives and Priorities.
- **Chapter 3** summarises the *lessons learned* from the evaluation of past ICT Policy Measures and provides a number of 'good practice' examples from past ICT policy making and implementation.
- **Chapter 4** describes *existing cooperation* between Ukrainian and EU27 organisations, in the ICT business and research domains, as well as relevant policies and programmes that support such collaborations. Importantly, it also describes the *barriers to cooperation* in ICT area between Ukrainian and EU27 organisations.
- **Chapter 5** concludes with a set of *preliminary policy recommendations* to support future ICT co-operation between Ukraine and the EU. These recommendations These recommendations were classified per level of importance to strategic (medium-to-long term) and operational (short-to-medium term)) as well as per different target group involved (i.e. research community, private industry and government) in each region (namely in Ukraine and in EU). The *key findings* and *preliminary recommendations* constituted the *main background documents both for the consultations* (i.e. consultation questionnaire and workshops) as well as for *the policy workshops* organised in Ukraine.

Changes in May 2010 (revised 1st version)

The revised 1st version of the document contains ***expanded policy recommendations in Chapter 5***, which identify critical points for attention in Ukraine and provide suggestions for concrete steps towards tangible results in improving cooperation between Ukraine and the EU within the ICT sector. These suggestions address instruments for improving policy at strategic and operational levels as well as different target audiences (RTD, Private Industry and Government) with regards to potential actions at national and EU level

Changes in December 2010 (2nd version)

The 2nd (and final) version of the document captures the major changes in ICT related governance that took place in Ukraine in 2010. In July, the State Informatization Committee and State Committee of Ukraine for Scientific, Technical and Innovative Development were re-organised into the State Committee on Science, Innovations and Informatization of Ukraine. Then, in December, the Committee was re-organised once more into the State Agency on Science, Innovations and Information of Ukraine. Also, the Ministry of Transport and Communications was re-organised into the Ministry of Infrastructure of Ukraine whilst the Ministry of Education and Science was re-organised into the Ministry of Education, Science, Youth and Sports. This report uses the former organisation names for policy measures etc implemented before 2010, and the new organisation names for measures implemented since then.

Remark

The title of this deliverable initially was "White paper on ICT R&D in Belarus and Ukraine" but following the discussions (during the negotiations) regarding the EECA cluster, it was renamed to address the common activities (p.23 of ANNEX I).

Executive Summary

Ukraine is a relatively young state which has inherited substantial industrial potential from Soviet times. Following a decade of deep economic crisis (in the 1990s the country's Gross Domestic Product (GDP) dropped to the 40% of the level in 1989!), the economy has grown rapidly with an average annual rate of 7.4% over the period 2000-2006. However, the country still needs several more years to reach the GDP level of Soviet times. Within this context, it was long recognised that the creation of an information society on a similar level to international standards is one of the main priorities of the Ukrainian government.

At **policy level**, several key actors (i.e. committees and organisations) are involved in ICT governance and operated under the Ministry of Infrastructure and the Ministry of Education, Science, Youth and Sports. Indicatively the following actors are mentioned:

Key actor	Role
State Informatization Committee	Created in 2008 is the central executive body (under the Ministry of Transport and Communications) focusing on the implementation of state policies in the sphere of informatization, usage of national information resources, and creation of conditions to ensure the information society development.
Interbranch Council on Development of Information Society	Created in January 2009 is a consultative-advisory body (under the Cabinet of Ministries of Ukraine) composed of representatives from the State Informatization Committee and key national ICT associations focusing on the preparation of proposals concerning state policy on development of information society and integration of Ukraine into the global information space
Committee on Science and Education	Under the *Ukrainian Parliament* which is focusing on the evaluation of legislative proposals from executive bodies, associations, and members of parliament.
State Agency on Science, Innovations and Information	The committee is responsible for developing and implementing state policy in scientific, scientific-technical activity, technology transfer, informatization, formation and usage of e-information resources, and conditions for stimulating information society development. Its activity is coordinated by the Cabinet of Ministries of Ukraine.
State Committee on Telecommunications and Informatization	The committee is responsible for the development of telecommunication services; branch preparation for Euro-2012; implementation of land digital video and radio broadcasting; implementation of energy saving technologies within the communication area.
National Academy of Sciences of Ukraine	Acts under the Cabinet of Ministries. It is the highest state-supported research organization, enrolling academicians, corresponding members and foreign members. It integrates all researchers of its institutions and carries out studies in various branches of knowledge, develops scientific fundamentals for technological, socio-economic and cultural advancement of the nation.

Until now, their actions were not sufficiently coordinated, and the funding available to address the demands for information society development and to improve Ukraine's competitive ICT position is considered insufficient. There is no clear distinction between the national bodies who design ICT policy and those that implement ICT policy. Instead, authority is split between a number of legislative and executive branches, while local and regional authorities can develop their own programmes and ministries can work out branch programmes and ICT projects.

Moreover, there are currently no special mechanisms for appraising the impact of policy and regulatory proposals on ICT performance in the country. The evaluation of national ICT policy is captured in an annual report issued by the Cabinet of Ministries to the Parliament of Ukraine and is an element of accountability for the executive authorities to the legislative authorities. The monitoring of the ICT sector development, even though was first started in 1998 with the preparation of government reports about informatization in Ukraine, the statistical data used were insufficient to build a modern view on information society development. Consequently, the main value of the reports was the *qualitative* information that they provided.

However, ***the situation is expected to change*** in the following years as Ukraine demonstrates great interest to learn from European and global experience in ICT development at all levels, starting from state structures to organizations and institutions. Indicatively the following actions are mentioned:

- many forums, conferences, workshops, and meetings were held / are planned with international organisations to exchange experiences and concerns, resulting to a decision to developing a clear and standardized methodology for designing ICT policy, based on a set of e-indexes (to contact international benchmarking with other countries) following the "World Summit on the Information Society" in Tunis (2005) (*the system is planned to be finalised by the end of 2009*).
- key European documents regarding ICT development are analyzed and translated;
- several national programmes have been designed and are currently under implementation and positive results are starting to be visible (for example the state agencies are equipped modern computers boosting e-government advances over the coming years, public schools are equipped with modern computers, the Ukrainian High Performance Computer cluster has been developed, ICT infrastructure is being modernised, etc);
- several agreements have been signed (mainly) with the European Union assisting the collaboration in ICT R&D, such as the "Agreement on Co-operation in Science and Technology" with the EU and the "bilateral EU-Ukraine European Neighbourhood Policy Action Plan", under which participation of Ukrainian research organisations in relevant Framework Programmes for Research as well as technical assistance and information exchange (TAIEX) is foreseen.

Based on (a) the analysis of the several laws, decisions and activities taken aiming to the development of the ICT sector in Ukraine, (b) the recommendations formulated during Parliamentary proceedings on information society development in 2005 and (c) the report of the Cabinet of Ministries of Ukraine entitled "*About conditions and perspectives for development of informatization of Ukraine in 2008*", the following ***Strengths, Weaknesses, Opportunities and Threats (S.W.O.T.)*** in the ICT governance have been identified.

ICT governance SWOT overview

Strengths	Weaknesses
• Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015 • Special body of executive branch - State Informatization Committee – was created for coordination of realization of state policy in spheres of informatization • All bodies of ICT governance in Ukraine have a big interest to develop international cooperation in ICT • Presence of national scientific schools	• Low ICT RTD financing • Results of research in the ICT area are not efficiently used in practical technical projects • Coordination of ICT policies and activities of different government authorities is at early stage of development • Private sector has insufficient influence on ICT governance
Opportunities	**Threats**
• Establishing of effective coordination of different bodies of state authorities regarding common ICT policy working out • Use of foreign aid programmes to facilitate ICT policy development based on European best practise (e.g. TAIEX). • Recognition of ICT as a main driver of innovation development to transform Ukraine into advanced technological country • Development of cooperation with the European Union in scientific and technological areas • Improving conditions for attracting private capital to the ICT sector	• Insufficient financing of adopted programmes and plans • Changing government priorities concerning basic areas of Ukraine's development • No effective decision making in the sphere of innovation policy • Departure of skilled Ukrainian specialists (brain drain) • Augmentation of technological divide between EU countries and Ukraine • Deterioration in terms for business-company activities in ICT sphere

At **research and industrial level**, Ukraine is on the verge of important reforms. A strong ICT related *education* and *research* feature are evident (a large numbers of highly qualified specialists in ICT, mathematics, and cybernetics are trained within Ukrainian universities and high level of scientific research is being carried out in a wide range of ICT fields). However, the ICT *infrastructure* is currently in a state of

upgrade and renewal: IT techno-parks have been established; modern ICT systems and telecommunication facilities installed; and communication and Internet usage is constantly growing.

In contrast, formal rules complicate the access of the *private* sector to financial sources in ICT area. The Ukrainian business ICT sector is dominated by state-owned or state-adjacent enterprises, creating a difficult environment for new companies (and especially for Small and Medium sized Enterprises) that are not state-owned, since there is limited communication between the state and private companies. The situation is hindered by the absence of tax incentive schemes to facilitate their participation in ICT Research and Development (R&D) activities. Consequently, non state-owned private companies have a limited agenda for research, while there is no specific legislation regarding Public-Private Partnerships.

In general, although the actions (policy measures) focusing on the development of the ICT sector are considered efficient (*a number of good practice in ICT policy making and implementation since 2000 are included in section 3.2*), the Ukrainian ICT still remains behind that of other developed countries.

On the other hand, Ukraine is increasingly emerging as a low cost hub for high quality software development. This is reflected in the relative amount of ICT services exported (% of total services exported), which has increased over 40% from 2.5 to 3.6 between 2000 and 2007 (*Source: World Bank's "ICT at a Glance" 2009 report, http://devdata.worldbank.org/ict/ukr_ict.pdf*). 'Exported ICT services' include IT consulting, integration, software re-engineering, software testing and outsourcing. This highlights the significance of highly skilled labour in Ukrainian IT export. About 1900 companies work in this market segment. Sales orders to Ukrainian software companies come mainly from the USA, Canada, Germany, France, Israel, and Russia.

Currently, a number of ***good case-studies*** of collaboration between Ukrainian ICT private companies and research institutes and their EU/global counterparts exist, illustrating a large potential for future collaboration (indicative lists are included in *sections 4.1 and 4.2*). The main barriers that inhibit the increase of such collaborations have been identified and several policy measures have been designed (both by the EU and the Ukrainian government) to addresses them.

Meanwhile, several gaps in policy response to enhance further the collaboration between EU and Ukrainian ICT actors still exist. Based to an analysis of those gaps, carried out by the SCUBE-ICT partners, the following recommendations are proposed:

Recommendations to support future ICT co-operation with the EU

Based on an analysis of the gaps in policy response to EU-Ukraine research cooperation barriers for universities and public research organisations (Exhibit 28) and private industry (Exhibit 29), the following concrete steps and instruments are recommended to improve cooperation within the ICT R&D sector. The suggestions target different ICT actors (i.e. RTD community, private industry and government) in each region (namely in Ukraine and in EU) and are separated between strategic (medium-to-long term) and operational levels (short-to-medium term and/or making use of existing policy measures).

1.1 Recommendations for Ukrainian ICT RTD community

RTD Community
Strategic Level
Recommendation #1 Recommend to DG Information Society and Media (DG INFSO) to fund future dedicated SICA projects as well as support actions aiming to support cooperation between the EU's and Ukraine's ICT RTD Communities in FP7 ICT throughout the FP7 programme (up to 2013), as well as prepare the ground for FP8-ICT (beyond 2013). Responsible Organisation(s): ICT RTD Community actors (e.g. Lviv Centre of S&T and Economic Information (LvCSTEI), Glushkov Institute of Cybernetics (GIC), Institute of Artificial Intelligence Problems (IAIP) and Technology Business Incubator "Kharkov Technologies" (TBI)).

Timing: 2011-2015

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3

Recommendation #2

Elaborate a concise draft and recommend to the Ministry of Infrastructure and Ministry of Education, Science, Youth and Sports to launch a competitive "ICT technology transfer" programme where consortia comprising of High Educational Institutes (HEI), public research organisations and industrial partners implement technology-transfer projects (from academic/public research organisations to industry). The programme should be largely "bottom-up" driven, where government defines broad ICT themes but consortia formulate their own specific proposal ideas and compete against each other. The programme should allow the participation of EU RTD actors well as private companies at their own costs.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

Recommendation #3

Ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU know-how on how to run an ICT based business incubator.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

Recommendation #4

Ask for support to ICT technology transfer from the Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA). This project aims to support the development of technoparks and innovative clusters to support innovation and technology transfer.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

Operational Level

Recommendation #1

Organise annual SICA (Special International Cooperation Action) EU-Ukraine scientific workshops in Ukraine focussed on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshops will be to pinpoint ICT research topics which could form the basis of EU-Ukraine SICA calls in future FP ICT work programmes. Present and recommend findings State Agency on Science, Innovations and Information, Ministry of Education, Science, Youth and Sports, Academy of Science of Ukraine and DG Information Society and Media (DG INFSO).

Responsible Organisation(s): ICT RTD Community actors (e.g. Lviv Centre of S&T and Economic Information (LvCSTEI), Glushkov Institute of Cybernetics (GIC), Institute of Artificial Intelligence Problems (IAIP) and Technology Business Incubator "Kharkov Technologies" (TBI)).

Timing: 2011-2012.

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 2

Recommendation #2

Ask the Project Administration Office for the EU technical assistance project "*Joint Support Office for Enhancing Ukraine's Integration in the European Research Area*" (EuropeAid/127891/C/SER/UA) to support the strengthening of national (and possibly regional) FP7 ICT national contact point (NCP). This project will include capacity building for a local Joint Support Office to increase participation in FP7.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 2

Recommendation #3

Recommend to the State Agency on Science, Innovations and Information to organise and/or financially support regular/annual FP7 ICT awareness raising/training workshops involving European ICT experts from RTD Community and Private Industry.

Responsible Organisation(s): ICT RTD Community actors (e.g. Lviv Centre of S&T and Economic Information (LvCSTEI), Glushkov Institute of Cybernetics (GIC), Institute of Artificial Intelligence Problems (IAIP) and Technology Business Incubator "Kharkov Technologies" (TBI))

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 2

Recommendation #4

Increase the mobility of Ukrainian researchers. Set-up agreements with EU leading RTD organisations for joint RTD experiments, internships, etc.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

1.2 Recommendations for Ukrainian ICT Private Industry

Private Industry

Strategic Level

Recommendation #1

Ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU branding know-how and export promotion experience for the national IT outsourcing sector (e.g. between Ukraine's Ministry of Infrastructure and Romania's Ministry of Communication and Information Society, which helped implement RomaniaIT, www.romaniait.com).

Responsible Organisation(s): Organisations representing Ukrainian ICT Private Industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 29): 1

Recommendation #2

Recommend to DG INFSO to fund future dedicated EECA SICA research projects as well as support actions aiming to support cooperation between the EU's and Ukraine's ICT Private Companies in FP7 ICT throughout the FP7 programme (up to 2013), as well as prepare the ground for FP8-ICT (beyond 2013).

Responsible Organisation(s): Organisations representing Ukrainian ICT Private Industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI)

Timing: 2011-2015

ICT Cooperation Barrier Addressed (Exhibit 29): 3

Operational Level

Recommendation #1

Encourage Ukrainian ICT Private Industry to make greater use of the STCU's (Science and Technology Centre in Ukraine) technology transfer and research partnerships programmes. These are programmes that enable STCU partners (e.g. various EU member states) to utilise the R&D and technology know-how of science and technology organisations from Ukraine. For example, the STCU should ask Ukrainian ICT organisations to submit new technologies and R&D competencies that they wish to have promoted via the STCU website (www.stcu.int).

Responsible Organisation(s): Organisations representing the Ukrainian ICT private industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 29): 2

Recommendation #2:

Ask for support to ICT technology transfer from the Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA). This project aims to support the development of technoparks and innovative clusters to support innovation and technology transfer.

Responsible Organisation(s): Ukrainian Business Incubators and Innovation Centres Association (UBICA).

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 29): 2

Recommendation #3

Recommend to the State Agency on Science, Innovations and Information to organise and/or financially support regular/annual FP ICT awareness raising/training workshops involving European ICT experts from RTD Community and Private Industry.

Responsible Organisation(s): Organisations representing Ukrainian ICT Private Industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 29): 3

1.3 Recommendations for Ukrainian Government

Government

Strategic Level

Recommendation #1

Recommend to DG Information Society and Media (DG INFSO) to fund future dedicated SICA projects as well as support actions aiming to support cooperation between the EU's and Ukraine's ICT RTD Communities in FP7 ICT throughout the FP7 programme (up to 2013), as well as prepare the ground for FP8-ICT (beyond 2013).

Responsible Organisation(s): State Agency on Science, Innovations and Information and Ministry of Education, Science, Youth and Sports.

Timing: 2011-2015

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3

Recommendation #2

The State Agency on Science, Innovations and Information should ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU know-how and experience of ICT R&D policy development, indicators, monitoring and evaluation.

NB: The twinning project should complement current work being done by the Ukrainian Government in the IBRD funded project to develop a national statistics system for monitoring social and economic transformations.

Responsible Organisation(s): State Agency on Science, Innovations and Information

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 5

Recommendation #3

The Ministry of Infrastructure and Ministry of Education, Science, Youth and Sports should launch a competitive "ICT technology transfer" programme where consortia comprising HEI, public research organisations and industrial partners implement technology-transfer projects (from academic/public research organisations to industry). The programme should be largely "bottom-up" driven, where government defines broad ICT themes but consortia formulate their own specific proposal ideas and compete against each other. The programme should allow the participation of EU RTD actors as well as private companies.

Responsible Organisation(s): Ministry of Infrastructure and Ministry of Education, Science, Youth and Sports

Timing: 2011-2015

ICT Cooperation Barrier Addressed - Exhibit 28: 2 and Exhibit 29: 3

Operational Level

Recommendation #1

Organise bi-annual SICA (Special International Cooperation Action) EU-Ukraine policy workshop focussed on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshop will be to agree on ICT research topics which could form the basis of EU-Ukraine SICA calls in a future FP ICT work programmes.

Responsible Organisation(s): State Agency on Science, Innovations and Information, Ministry of Education, Science, Youth and Sports and DG INFSO.

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 1 and 2 and Exhibit 29: 3

Recommendation #2

The State Agency on Science, Innovations and Information should fund the Ukrainian RTD community to regularly organise (e.g. on annual basis), FP ICT awareness raising/training workshops involving European ICT experts from RTD Community and Private Industry (through a bi-annual competitive call).

Responsible Organisation(s): State Agency on Science, Innovations and Information

Timing: 2011-2015

ICT Cooperation Barrier Addressed - Exhibit 28: 2 and Exhibit 29: 3

Recommendation #3
The Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA) should ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU know-how on how to run an ICT based business incubator.

Responsible Organisation(s): Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA).

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 2 and Exhibit 29: 3

1.4 Recommendations for EU ICT RTD community and Private Industry

RTD community and Private Industry

Strategic Level

Recommendation #1
Urge ETPs, EECA cluster, etc to recommend to DG INFSO to fund future dedicated EECA SICA projects as well as support actions aiming to boost cooperation between the EU's and Ukraine's ICT research and industrial communities in FP7 ICT throughout the FP7 programme (up to 2013) as well as prepare the ground for FP8 ICT (beyond 2013).

Responsible Organisation(s): EECA cluster, SCUBE-ICT consortium, ETP's international relations secretariat.

Timing: 2011-2015

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3

Recommendation #2
The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the State Agency on Science, Innovations and Information about the potential for funding an ENPI Twinning Project focused on transferring EU know-how and experience of ICT R&D policy development, indicators, monitoring and evaluation.

NB: The twinning project should complement current work being done by the Ukrainian Government in the IBRD funded project to develop a national statistics system for monitoring social and economic transformations.

Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 5

Operational Level

Recommendation #1
Urge the Ukrainian research diaspora (i.e. Ukrainian researchers working in EU) and ETPs to support the organisation of SICA (Special International Cooperation Action) scientific workshops in EU focussing on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshops will be to pinpoint ICT research topics which could form the basis of EU-Ukraine SICA calls in future FP ICT work programmes. Present and recommend findings to DG INFSO as well as the State Agency on Science, Innovations and Information and Ministry of Education, Science, Youth and Sports

Responsible Organisation(s): Ukrainian research diaspora, ETP international relation secretariat, DG INFSO as well as the State Agency on Science, Innovations and Information, Ministry of Education, Science, Youth and Sports

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 2

Recommendation #2

Set-up agreements with Ukrainian leading RTD organisations for joint RTD experiments, internships, etc through suitable funding (e.g. FP Capacities programme) or other funding instruments.

Responsible Organisation(s): EU leading ICT RTD actors

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

1.5 Recommendations for European Commission

DG Information Society and Media (INFSO), DG Research and EU Delegations

Strategic Level

Recommendation #1

The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the State Agency on Science, Innovations and Information about the potential for funding an ENPI Twinning Project focused on transferring EU know-how and experience of ICT R&D policy development, indicators, monitoring and evaluation.

NB: The twinning project should complement current work being done by the Ukrainian Government in the IBRD funded project to develop a national statistics system for monitoring social and economic transformations.

Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 5

Recommendation #2

The DG INFSO should fund future dedicated EECA SICA projects as well as support actions aiming to boost cooperation between the EU's and Ukraine's ICT research and industrial communities in FP7 ICT throughout the FP7 programme (up to 2013) as well as prepare the ground for FP8 ICT (beyond 2013).

Responsible Organisation(s): DG INSFO

Timing: 2011-2015

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3

Recommendation #3

The Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA) should discuss potential ICT technology transfer support with the Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA). This project aims to support the development of technoparks and innovative clusters to support innovation and technology transfer.

Responsible Organisation(s): Project Administration Office for the EU technical assistance project

"*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

Operational Level

Recommendation #1

DG INFSO in cooperation with SCIC and the Ministry of Education, Science, Youth and Sports of Ukraine should organise a bi-annual SICA EU-Ukraine policy workshop focussed on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshop will be to pinpoint ICT research topics which could form the basis of EU-Ukraine SICA calls in future FP ICT work programmes.

Responsible Organisation(s): DG INFSO as well as State Agency on Science, Innovations and Information and Ministry of Education, Science, Youth and Sports.

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 1 and 2 and Exhibit 29: 3

Recommendation #2

Encourage key Ukrainian and European ICT research organisations to participate in the following three European Neighbourhood and Partnership Instrument (ENPI) programmes:

- Poland-Belarus-Ukraine Cross Border Cooperation (CBC)
- Hungary-Slovakia-Romania-Ukraine CBC
- Romania-Ukraine-Republic of Moldova CBC

Although not explicit schemes to support ICT cooperation, the priorities of the programmes allow such activities to be funded e.g. Priority 1 of P-B-U CBC - increasing competitiveness of the border area (which covers activities such as improving accessibility to education services e.g. e-Learning, and joint actions to promote and support research and business institutions). The programme is open to regional and local authorities, non-governmental organisations and non-profit organizations, as well as organisations, providing services on the field of culture, research or science.

Responsible Organisation(s): Joint Technical Secretariat (JTS) Cross Border Cooperation Programme and the European Commission's Delegation to Ukraine.

Timing: 2011-2015

ICT Cooperation Barrier Addressed - Exhibit 28: 1 and 3 and Exhibit 29: 2

Recommendation #3

The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA) about the potential for funding an ENPI Twinning Project focused on transferring EU know-how on how to run an ICT based business incubator.

Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 3 and Exhibit 29: 2

Recommendation #4

The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the Ministry of Infrastructure and Association of Information Technology Enterprises of Ukraine (APITU) about the potential for funding an ENPI Twinning Project focused on transferring EU branding know-how and export promotion experience for the national IT outsourcing sector (e.g. between Ukraine's Ministry of Infrastructure and Romania's Ministry of Communication and Information Society, which helped implement RomaniaIT, www.romaniait.com).

Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 29): 1

Recommendation #5

The Project Administration Office for the EU technical assistance project "*Joint Support Office for Enhancing Ukraine's Integration in the European Research Area*" (EuropeAid/127891/C/SER/UA) should discuss support for the establishment and training of national (and possibly regional) FP7 ICT national contact point (NCP) with the Ministry of Education, Science, Youth and Sports. This project will include capacity building for a local Joint Support Office to increase participation in FP7.

Responsible Organisation(s): Project Administration Office for the EU technical assistance project "*Joint Support Office for Enhancing Ukraine's Integration in the European Research Area*" (EuropeAid/127891/C/SER/UA)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 2

1 The National ICT Sector and its Governance

1.1 The National ICT Sector

The main government body responsible for the design and realization of national policy in the sphere of informatization, the formation and usage of national information resources and the promotion of information society development is the ***State Agency on Science, Innovations and Information***. A number of legal norms governing the information society in Ukraine have been established to regulate social relations regarding information e-resources creation; intellectual property rights protection; implementation of electronic document management on the basis of e-digital signature; and information protection.

The Information and Communication Technologies (ICT) **infrastructure** in Ukraine is currently in a state of upgrade and renewal: IT techno-parks have been established; modern ICT systems and telecommunication facilities installed; and communication and Internet usage is constantly growing.

ICT related **education** and **research** feature quite strongly in the national ICT sector. Ukrainian universities train large numbers of highly qualified specialists in information-communication technologies, mathematics, and cybernetics, while they carry out scientific research in a wide range of ICT priorities. A number of Ukraine's ICT research institutes – legacies of the former Soviet Union – are internationally known such as:

- Kyiv Polytechnic Institute (www.kpi.ua);
- V.M. Glushkov Institute of Cybernetics of the Ukraine National Academy of Science (www.icyb.kyiv.ua);
- Kharkov Polytechnic Institute of the National Technical University (www.kpi.kharkov.ua); and
- Donetsk State University of Informatics and Artificial Intelligence (www.iai.edu.ua).

The Ukrainian **business** ICT **sector** is dominated by state-owned or state-adjacent enterprises. This creates a difficult environment for new companies and especially for Small and Medium sized Enterprises (SMEs) that are not state-owned, since there is limited communication between the state and private companies. The situation is hindered by the absence of tax incentive schemes to facilitate their participation in ICT Research and Development (R&D) activities. Consequently, non state-owned private companies have a limited agenda for research, while there is no specific legislation regarding Public-Private Partnerships. However, a number of active and powerful IT associations, which can exert significant influence on the decisions of Governmental and legislative bodies – such as the Association of Information Technology Enterprises of Ukraine (www.apitu.org.ua) – have been established and many organisations involved in the Ukrainian ICT market are joining them.

Meanwhile, Ukraine is establishing itself as an important global centre for *offshore programming*. Many of the world's most acknowledged ICT companies – such as Microsoft, Sun, IBM, Dell, Cisco etc - have established representative offices in Ukraine in order to tap into the local market. Despite this, Ukraine suffers from a lack of IT intermediaries in comparison with the Europe Union countries. This is reflected in the low level of innovation activity across the country.

A comprehensive (but not exhaustive) list of organisations involved in the ICT sector can be found in Annex 3.1 at the end of this document.

1.2 The ICT Governance System

Two ministries within the executive branch – the ***Ministry of Infrastructure*** and the ***Ministry of Education, Science, Youth and Sports*** - are overall responsible for the national ICT sector development. In past years, the ***State Committee for Communication and Informatization***, under the Ministry of Transport and Communications of Ukraine, was responsible for the ICT sector. However, since 2008, the responsibility has been transferred to the ***State Informatization Committee*** and ***State Administration of Communications*** under the Ministry of Transport and Communications (on the basis of the State Committee for Communication and Informatization). And in 2010 the Committee was re-organized into the State Agency on Science, Innovations and Information as it is mentioned previously.

The ***State Agency of Science, Innovations and Information*** is the central executive body whose activity is the implementation of state policies in the sphere of informatization, usage of national information resources,

and creation of conditions to ensure the information society development. The *Agency* is responsible for the effective use and protection of national information resources and the development and implementation of the "***National Informatization Programme***". Additionally, the *Agency* coordinates the activities of the organization responsible for administration of the national Internet address space, including the domain .ua . Currently, the *Agency* is in a stage of development and it is, thus, considered to be understaffed with a limited budget.

Taking into account the significance of the ICT sphere for national development, the ***Interbranch Council on Development of Information Society*** - under the Cabinet of Ministries of Ukraine - was created in January 2009 as a consultative-advisory body. It is composed of representatives from the State Agency on Science, Innovations and Information and key national ICT associations and is headed by the Deputy Prime Minister of Ukraine. Its main task is the preparation of proposals concerning state policy on development of information society and integration of Ukraine into the global information space.

The ***Committee on Science and Education*** of the *Ukrainian Parliament* (Verkhovna Rada) evaluates legislative proposals from executive bodies, associations, and members of parliament. Proposals that are accepted are then proposed to the Parliament, which is the only authorized body to propose a national budget to fund programmes in the ICT sphere, while all proposals must be then approved by *Ministry of Finance of Ukraine*. The *President of Ukraine* and the *National Security and Defence Council of Ukraine* also play a role in certain aspects of ICT policy development, such as information security.

The management of ICT R&D organizations falls under the governance of the ***National Academy of Sciences of Ukraine*** of the Cabinet of Ministries. The National Academy of Sciences has 14 research institutions engaged in fundamental and applied ICT research. There is a number of highly qualified scientists and specialists that work in the ICT area. The number of specialists graduating from ICT departments of the academies represents about 3% of the total number of graduates in Ukraine.

The activities of the aforementioned bodies play an influential role in the development of the national ICT sector, so it is important that they are open and transparent.

Improving Ukraine's position in global ICT ranking systems should become one of the main criteria for assessing the efficiency and effectiveness of state bodies. The state bodies that should be evaluated include:

a) the *State Agency on Science, Innovations and Information* and the *State Administration of Communications* under the *Ministry of Infrastructure*;
b) the *National Committee on Communication Regulation issues*; and
c) the *State Department of Intellectual Property* under the *Ministry of Education, Science, Youth and Sports*.

1.3 Appraisal of the National ICT Governance System

1.3.1 Policy Making and Evaluation Practices

Policy design

The ***State Agency of Science, Innovations and Information*** is the body responsible for the design of national ICT policy measures. At the same time local and regional authorities can develop their own programmes, while ministries can also work out branch programmes and ICT projects. A new version of the Decree of the Cabinet of Ministries of Ukraine №294 "*About the introduction of changes to examination procedure of the national programme of informatization and its separate tasks (projects)*" was adopted on April 2, 2009. The new edition of this procedure foresees an obligatory requirement that projects must be expertly examined. However, the financing of such examinations, as a rule, must be covered by the project applicant organization. Meanwhile, the participation of foreign experts is possible but it is not funded in full.

The State Agency on Science, Innovations and Information develops partnerships with key stakeholders including business-associations. To coordinate these efforts, the ***Public Council*** (*Gromadska rada*) was created in order to assure consultation with the ICT community on the formation and implementation of state policy in the sphere of ICT, while a ***scientific-technical council*** was created involving ICT sector specialists

from different ministries and scholars from the National Academy of Science. Meanwhile, the *Agency* prepares an annual report entitled "*About the conditions and future prospects of informatization of Ukraine*", which contains a deep analysis of the problems of ICT development in Ukraine and determines the main tasks for the next year.

However, there is no clear distinction between the national bodies who design ICT policy and those that implement ICT policy. Instead, authority is split between a number of legislative and executive branches.

Policy review

Currently, there are no special mechanisms for appraising the impact of policy and regulatory proposals on ICT performance in the country. Nevertheless, different proposals for research, development and innovation activities have a direct effect on the ICT sector.

Ukraine is on the verge of important reforms in these particular areas and, no doubt, the new documents that will be adopted will have an influence on the ICT sphere as well. A revision of the national ICT policy was initiated in 2005 by the scientific-technical community following the creation of the Ukrainian Forum "***Information Society of Ukraine***" and a series of *"Parliamentary debates on the development of information society*" were launched. On the basis of the recommendations from these debates, a new law was adopted in 2007 entitled "*About Main Priorities for Development of an Information Society in Ukraine for 2007-2015*".

The evaluation of national ICT policy is captured in an annual report issued by the Cabinet of Ministries to the Parliament of Ukraine and is an element of accountability for the executive authorities to the legislative authorities. A draft copy of the report is distributed amongst the *advisory* and *scientific-technical council* of the State Agency on Science, Innovations and Information and it is discussed by an inner circle of specialists that is engaged by the *Agency* in an official capacity, while the final report is publicly available through the *Agency's* website (www.dknii.gov.ua).

Sector monitoring

Until recently, a clear and standardized methodology – based on indicators, benchmarks and evaluation results – for designing ICT policy in Ukraine did not exist. To cope with this problem, the government decided in 2008 to establish a national system of ICT indicators based upon European best practise. According to the planning, this system should be completed by the end of 2009.

The monitoring of the development of ICT sector was first started in 1998 with the preparation of government reports about informatization in Ukraine. However, the statistical data used in the reports were insufficient to build a modern view on information society development. Consequently, the main value of the reports was the *qualitative* information that they provided. The use of the *quantitative* data - to assess the national ICT performance and development - in the reports were rather limited due to:

a) lack of a standardised system of indicators concerning national ICT sector development, due to annual changes to the system of indicators, fuzziness of terminology etc;
b) inconsistency in the statistical data from year-to-year as a result of changing of the methods for gathering information and the respective methodology of its usage;
c) avoidance of national ICT sphere assessment by international and foreign institutions and organizations; and
d) evaluation of only past actions and policies (*ex-post evaluation*) and no effort was made to estimate and forecast future activities and developments (*ex-ante evaluation*).

The creation of a single ICT performance measurement system remains an unsolved problem, which complicates the formation and realization of effective national policy and state government.

Exhibit 1: Overall appraisal of policy making and evaluation practice

Policy making/evaluation practice	Benchmark	Ranking (1 to 5)
Openness of the process of designing ICT policy (measures)	Policy development is undertaken through a partnership based approach involving consultation of key stakeholders at all stages	4
Quality of inputs to policy making (application of evidence based techniques, use of evaluation results)	Policy design is systematically evidence-based and account is taken of evaluation results	3
Regularity and transparency of policy monitoring and review processes	All major policy documents and instruments are the subject of a regular review involving stakeholder consultation	4
The impact on ICT of developments and regulations in other policy fields is appraised	A well-structured process exists for impact assessment of new regulations on ICT and/or ICT is taken into account as an issue in other policy documents.	2
Existence of coordination mechanisms (high-level councils, inter-ministerial committees, etc.)	Well organised coherent system of policy coordination at government and agency levels	4
Existence of an "evaluation culture" in the field of ICT policy	ICT policy measures are systematically evaluated at key milestones in their implementation.	3
External versus internal evaluations of ICT policy measures	Evaluations respect good practice criteria (involve systematically external experts, evidence based, quality appraisal of evaluation reports, etc.)	1
Transparency and publication of results of evaluations	All evaluations are published &/or discussed in a public forum.	4

Ranking: Compared to the benchmark current practice in the country is judged to be: 1. Completely unsatisfactory, 2. Unsatisfactory (room for improvement), 3. Satisfactory, 4. Above average compared to other EU countries, 5. Best practice in the EU

Note: An evaluation culture (or culture of evaluation) is one in which evaluation, and the lessons drawn from it, form an important element of ICT programme management and policy formulation.

1.3.2 Policy Benchmarking and Transnational Learning

Policy benchmarking

Ukrainian policy makers systematically review principal ICT policy documents from other countries. Speakers and papers presented at the "*World Summits on the Information Society*" (e.g. Geneva-2003 and Tunis-2005) have had a major influence on the development of new ICT programmes in Ukraine during recent years. For example, Ukraine started to use some *e-indexes* in order to conduct international benchmarking with other countries following the "World Summit on the Information Society" in Tunis (2005). However, the use of indexes is not systematic and depends on the scope and regularity of the benchmarking exercises ordered or performed. As a result, such indexes have currently little impact on ICT policy development in Ukraine. The indicators most commonly used are:

- index of digital opportunities or digital perspective (***Digital Opportunity Index, DOI***), worked out by the International Telecommunications Union (ITU, www.itu.int) within the Organisation for Economic Co-operation and Development (OECD, www.oecd.org) Working Party on Indicators for the Information Society (WPIIS);
- index of network readiness (***Networked Readiness Index, NRI***), World Economic Forum (www.weforum.org);
- index of information society (Information Society Index, ISI), IDC company (www.idc.com);
- index of digital access (***Digital Access Index, DAI***), ITU;
- index of digital divide (***Digital Divide Index, DDI***), Orbicom network of UNESCO Chairs in Telecommunications (www.orbicom.ca);
- index of ICT diffusion (***ICT Diffusion Index, ICTDI***), United Nations Conference on Trade and Development (UNCTAD - www.unctad.org).

International collaboration

In order to facilitate cooperation between Ukraine and the European Union, the sub-committee № 7 "*Science and technologies, researches and developments, education, culture, social health, information society and media*" was created in accordance with the Decree №1074 of Cabinet of Ministries of Ukraine since 13.07.1998. This sub-committee has established a working dialogue between central bodies of the executive branch of Ukraine and corresponding subdivisions of the European Union on topics such as socio-economic development, cooperation in education, science, culture, health protection and information society. ICT policy is also discussed during bilateral meetings with European countries' representatives.

Since 2003, consultations have been held with the Executive Directorate of the European Commission concerning an enhanced agreement between Ukraine and EU (to replace the previous partnership and cooperation agreement active since 1998), with "*Information Society Expansion*" being one of the agreement's priority areas. In October 2009, a new agreement entitled "***EU-Ukraine Association Agenda***" was enacted[1]. The agreement has the following two sections relevant to EU-Ukraine ICT cooperation:

"Information society
The Parties cooperate to support Ukraine in, and to prepare for implementation of EC acquis mentioned in relevant annexes of the Association Agreement, in particular by:

- *an assessment on the conformity of the new draft law on electronic communications submitted to Parliament in December 2008 with the EC acquis in this area, throughout the legislative process;*
- *strengthening of the independence and administrative capacity of the national regulator in the field of communications, in order to ensure its ability to take appropriate regulatory measures and enforce its own decisions and all applicable regulations and to guarantee fair competition in the markets, supported by Twinning projects, including with EU regulators;*
- *exchanging information and experience on the implementation of the EU Initiative "i2010" with a view to developing and implementing e-strategies in Ukraine, including implementing the National Concept for the Development of Telecommunications and State Programme 'e-Ukraine'"*

and

"Science and technology
- *renew and activate the EC-Ukraine S&T cooperation agreement, in order to enhance the participation of Ukrainian research entities in FP7 projects;*
- *use the available tools (S&T agreement, INCO-Nets) in order to prepare for a possible association of Ukraine to the Research Framework Programme;*
- *Ukraine to promote the activities of the ICT National Contact Points and involve the private sector in the research cooperation through participation in the ICT Theme of the 7th Framework Programme for Research."*

On 4-5 December 2007, a session meeting was held in Kyiv of the ***Working Group on Information Technologies and Communication*** of the Black Sea Economic Cooperation organisation (BSEC, www.bsec-organization.org) under the chairmanship of Ukraine. Participants exchanged their thoughts regarding the development of the ICT sphere in BSEC member countries and emerging opportunities for mutually beneficial development cooperation.

Meanwhile, the participation of a Ukrainian delegation at the United Nations Forum on Internet management, in November 2007 in Rio de Janeiro, led to the improvement of state policy on the issue. The policy was developed based on an organizational model of Internet management recommended by world experts and specialists.

Finally, Ukraine has signed agreements concerning cooperation in the ICT sphere with most of former Soviet Union countries. These agreements are general but there are separate themes in which common actions are foreseen. For example, with Kazakhstan, there is a specific cooperation agreement regarding ICT-incubator development. Furthermore, collaborative science research competitions – including in the ICT sphere – are often organised on a bilateral basis with countries such as Germany and Poland, with each country funding the participation of its own research organisations.

[1] EU-Ukraine Association Agenda, http://eeas.europa.eu/ukraine/docs/2010_eu_ukraine_association_agenda_en.pdf

In general, the Ukrainian government does not allocate budget to fund the exchange, or hire, of ICT policy staff and experts from ministries or agencies from other countries. However, some such activities are funded via different programmes of technical EU aid (e.g. the Technical Assistance and Information Exchange is an instrument of the Directorate-General Enlargement of the European Commission, TAIEX, http://taiex.ec.europa.eu) or within different projects funded by the European Commission and individual EU countries. Senior policy makers in Ukraine may participate in transnational networks aimed at ICT policy learning, but it is on their own initiative and not a standard practice.

Exhibit 2: Overall appraisal of policy benchmarking and learning initiatives

Tool for policy learning	Benchmark	Ranking (1-5)
Formal mechanisms for policy learning (studies, ICT observatories, study visits, joint events with other countries, etc.)	Exists on a permanent basis (e.g. observatory) or at least one occurrence on an annual basis	3
Application of foreign experience in designing measures (e.g. involvement of foreign experts in design phase)	Systematically (all new policy measures take into account foreign experience)	3
Exchange or hiring of ICT policy staff/ experts to/from other countries (e.g. twinning programmes with new member states or candidate countries)	Long-standing and regular policy of exchange of staff	2
Involvement of senior policy makers /executives in trans-national networks	Key government or agency staff are members in such networks and play an active role (e.g. management committee, organisation of events, etc.)	2
Carrying out quantitative or qualitative benchmarking exercises to assess comparative ICT performance (scoreboards, etc.)	Benchmarking is a systematic process & results are incorporated into policy	2
Implementing policy cooperation with other countries: bilateral or multilateral programmes on ICT, etc.	Many long-term agreements operating (specifically in field of ICT, technology transfer, etc. as distinct from scientific research agreements)	3

Ranking: Compared to the benchmark current practice in the country is judged to be: 1. Completely unsatisfactory, 2. Unsatisfactory (room for improvement), 3. Satisfactory, 4. Above average compared to other EU countries, 5. Best practice in the EU

1.3.3 Overall appraisal and SWOT of ICT governance

The creation of an information society on a similar level to international standards is one of the main priorities of the Ukrainian government. To this respect several positive steps have been taken, for example:

- In 2008, the ***State Committee of Informatization*** was created as a central executive body. Its main purpose is to implement state policy in the sphere of informatization, formation and usage of national information resources, promotion of development of an information society. One of the main tasks of the *Committee* is to coordinate ICT projects and programmes on behalf of different ministries, and regional as well as local authorities, even though, it doesn't have much influence on the decision making process concerning the national ICT sector.

- Recently, there has been some progress in this area and an ***Interbranch Council on Development of Information Society*** under the Cabinet of Ministries of Ukraine was created. The *Council's* role is to examine the national programme of informatization and made improvements to its various projects. This has provided the State Agency on Science, Innovations and Information with the opportunity to coordinate activities within the e-government and e-commerce areas, but also to manage the processes of informatization of state authorities and local governmental bodies. However, the funding of the national programme of informatization is still low, especially when compared to the funding of neighbouring European countries. The low state funding levels drive ICT organisations to seek funding from international sources, which are not necessarily agreed with or coordinated by the State Agency on Science, Innovations and Information.

- The ***Ministry of Education, Science, Youth and Sports*** and the ***National Academy of Science*** manage public funds for ICT R&D which, however, are not available to the private sector but aim at

universities and public research institutions. Research topics are formulated on the basis of research teams' and organizations' proposals, rather than on priorities influenced by private ICT companies or public demand for information society development.

Several key actors are involved in ICT governance in Ukraine, but their actions are not sufficiently coordinated, and the funding available to them is also insufficient to address the demands for information society development and to improve Ukraine's competitive ICT position. Also, formal rules complicate the access of the private sector to financial sources in ICT area.

On the other hand, there is great interest to learn from European and global experience in ICT development at all levels, starting from state structures to organizations and institutions. Many forums, conferences, workshops, and meetings were held / planned and key European documents regarding ICT development are analyzed and translated.

In general, Ukraine maintains significant scientific-technical potential in the ICT area and has the capability to successfully integrate into the European research area (ERA). Despite the existing problems, it is certainly feasible to tackle the following issues:

- improve cooperation between different ministries with regard to developing ICT policy;
- simplify access of private sector to participation in competitions of scientific-technical projects and research activity in ICT area;
- increase financing for the ICT area;
- attract more actively funding from international sources;
- provide better support to Ukrainian organizations in order to participate in EU competitions in the ICT area; and
- develop ICT governance in Ukraine based on EU best practise.

Exhibit 3: ICT governance SWOT overview

Strengths	Weaknesses
• Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015 • Special body of executive branch - State Agency on Science, Innovations and Information) – was created for coordination of realization of state policy in spheres of informatization • All bodies of ICT governance in Ukraine have a big interest to develop international cooperation in ICT • Presence of national scientific schools	• Low ICT RTD financing • Results of research in the ICT area are not efficiently used in practical technical projects • Coordination of ICT policies and activities of different government authorities is at early stage of development • Private sector has insufficient influence on ICT governance
Opportunities	**Threats**
• Establishing of effective coordination of different bodies of state authorities regarding common ICT policy working out • Use of foreign aid programmes to facilitate ICT policy development based on European best practise (e.g. TAIEX). • Recognition of ICT as a main driver of innovation development to transform Ukraine into advanced technological country • Development of cooperation with the European Union in scientific and technological areas • Improving conditions for attracting private capital to the ICT sector	• Insufficient financing of adopted programmes and plans • Changing government priorities concerning basic areas of Ukraine's development • No effective decision making in the sphere of innovation policy • Departure of skilled Ukrainian specialists (brain drain) • Augmentation of technological divide between EU countries and Ukraine • Deterioration in terms for business-company activities in ICT sphere

Important Notice

Most of the elements of this SWOT analysis are based on recommendations formulated during Parliamentary proceedings on information society development in 2005, as well as on a report of the Cabinet of Ministries of Ukraine entitled "*About conditions and perspectives for development of informatization of Ukraine in 2008*".

The new elements that have been added under ***strengths*** are:

- The adoption of the Law of Ukraine concerning "*The Main Priorities for Development of an Information Society in Ukraine for the period 2007-2015*";
- The creation of a special body of the executive branch ('State Informatization Committee') for coordination of realization of state policy in spheres of informatization.

The main ***weaknesses*** listed above have been already identified before, but remain unsolved. These unresolved weaknesses are particularly critical because, as has been noted in many EU countries, ICT plays an ever increasing role in innovation, knowledge-based economy and societal development. The technological gap that currently exists with EU countries could become an insurmountable one if it is not fully addressed soon.

On the other hand, new legislative initiatives and organizational decisions regarding the national ICT sector, as well as preparation of a new expanded agreement between Ukraine and EU, create new ***opportunities*** for ICT governance development in Ukraine.

Unfortunately, the lack of practical implementation of adopted ICT policy documents poses a continued ***threat*** to ICT development in Ukraine. For example, adopted and approved programmes often do not receive the full budget officially allocated to them. Also, frequent changes of governments lead to changes in ICT governance and unfulfilled adopted decisions. Meanwhile, foreign companies and research centres are aware of Ukraine's ICT scientists and professionals and offer attractive terms for them to work abroad. Unless, the several Decrees and Declarations are converted into practical actions, the country is at serious risk of "brain-drain".

2 Trends in the National ICT Sector and in National ICT Policy Objectives

2.1 Overview of the main trends in the National ICT Sector

2.1.1 Recent Trends in Macroeconomic and Market Developments

Ukraine is a relatively young state which has inherited substantial industrial potential from Soviet times. In the 1990s, the country passed through a deep economic crisis, when Gross Domestic Product (GDP) dropped to the 40% of the level in 1989. Ukraine was the only post-Soviet country that did not have a single year of economic growth during that decade. However, since 2000 the Ukrainian economy has grown rapidly with an average annual rate of 7.4% over the period 2000-2006, but the country still needs several more years to reach the GDP level of Soviet times. Due to political fighting between different political forces within the country, economic policy changed quite often. This leads to unstable economic growth reflected in an annual GDP growth rate that fluctuates between 2.6% to 12.4% per year.

Investments grew by a healthy 12.5% per year in real terms in 2001-2006 and labour productivity grew by more than 50% between 1997 and 2006. The World Bank's '*absolute poverty line*' fell from a peak of 31.7% in 2001 to just 7.9% in 2005. Key reason for the growth is an expansion of export and stable demand for the main Ukrainian export products (i.e. metals, basic chemicals, and some agricultural products) and services (i.e. transportation of Russian oil and gas) to the world market. In recent years, the internal market has played a growing role in economic development with salaries are growing at a faster rate than GDP as a whole!

The situation with external markets still determines the main parameters of the economy. As a result, the proportion of foreign trade to nominal GDP was about 90% in 2005-2006 (if the official exchange rate is used and not Purchasing Power Parity - PPP). This is real evidence of the 'external' orientation of the Ukrainian economy and the weakness of the internal market. However, the share of high-tech and medium-tech sectors (mainly, machine-building industry) relative to total exports amounted to around 15% during 2001-2005[2].

On the other hand, any slowdown in the world economy has a serious impact on the Ukrainian economy. The trade balance has become negative since 2005, and this created some problems in the financial sphere, although the overall government deficit is still well below the critical mark.

However, to begin with, internal political threats to economic stability need to be taken more seriously. Economic growth has opened the way for raising social benefits, including pensions and wages in the state sector. At the same time, calculations show that a doubling of the minimal level of pensions and an increase in wages will be difficult to sustain, as it will require more money than the authorities will have available. The budget deficit will soar and inflation could neutralize the positive results of recent developments.

Another source of problems is that growth is based on *existing* capacities. For example, as specialists from the ***Institute for Economic Forecasting*** of the *National Academy of Sciences of Ukraine* stress, the metallurgy sector, which brings in the lion's share of export revenues, has limited capacity for further expansion: 50% of its capital assets need substitution and the introduction of new technologies, especially in light of the government's intention to force metallurgy plants to pay the full price for their inputs to production and repay debts to the energy sector. Ukraine is one of the most energy-intensive economies in the world, with the energy intensity of Ukrainian GDP being close to triple the Organisation for Economic co-operation and Development (OECD) average and higher even than in neighbouring Russia and Belarus!

Moreover, it has been estimated that between 2.1 - 2.7 million Ukrainians work abroad (permanently or temporarily). Sometimes, Ukrainian officials mention much higher figures - up to seven million - but these figures have not been confirmed through sociological surveys or other independent sources[3].

As OECD experts stress "*Ukraine is lagging behind the more advanced transition countries of Central Europe with respect to market-oriented reforms, as the government is often focused more on preventing*

[2] Sobkevich O.V. Posylennia roli fondovogo rynku u formuvanni inovatsyinogo potencialu ekonomiki. //Naukovo-tehnichna informatsia. – 2006.- №4. - P.33-37 (Growing Role of Stock Market in Formation of the Innovative Potential of the Economy – in Ukrainian).
[3] 2000 Newspaper, 14 December 2007

structural changes than facilitating them[4]". State-owned enterprises, especially in gas, electricity and coal-mining sectors, still do not face hard budget constraints.

The stock of Foreign Direct Investments (FDI) per capita reached only 372 dollars in 2005, just over 16% of the corresponding figure for neighbouring Poland. As OECD experts note, given the potentially substantial positive effect of FDI on domestic Total Factor Productivity (TFP) growth, "*Ukraine is missing a major opportunity to facilitate industrial modernisation*[5]".

Overall, according to the World Economic Forum's Global Competitiveness Index (GCI), Ukraine was ranked in the 72nd place in 2009 with a score 4.09. The country's position had dropped four places compared to 2005[6]. There are two main reasons for such decline. Firstly, economic growth in 2005 was much lower than in the previous year, while some other countries have demonstrated significant improvement. Secondly, the 'soft' components associated with these indicators - level of freedom and political stability – have been in decline during recent years. On the other hand, as Exhibit 5 shows, progress in some areas of economic development is evident.

Exhibit 4: Comparable indicators of economic performance

Indicator	Ukraine performance		EU25 average	
	2001	2007	2001	2007
GDP per capita in PPP (EU25 average=100)	21.3	26.1	100*	100*
Real GDP growth rate (% change previous year)	9.2	7.6	2.0	3.0
Labour productivity per person employed (EU25 average=100)	6.9		100*	100*
Inflation rate (average annual)	5%	12.8	2.2	2.2
Unit labour costs (growth rate)	4.3 (estimate)	7.2 (estimate)	0.2	-0.8
Unemployment rate (as % of active population)	11.7%	6.4%	8.4%	7.9%
Foreign Direct Investment intensity	:	7.5	:	1.2^
Business investment as a percentage of GDP	19.7	16.3	17.8*	17.4*^
ICT Expenditure (% of GDP)	7.12	7.1	6.3	6.4[EIS]
Broadband Penetration Rate (% population with broadband access)	:	1.97	:	14.8[EIS]

Source: Eurostat - Structural Indicators and Long-term Indicators http://epp.eurostat.cec.eu.int

Key: (*) EU25 average, (^) of latest available year (for example: 2005); (:) not available; (EIS) European Innovation Scoreboard 2007

2.1.2 Recent Trends in ICT Performance

Overall, based on the World Bank's report "*ICT at a Glance*"[7], there have been major improvements in the ICT sector performance in Ukraine between 2000 and 2007:

- ***Access to ICT products and services*** has increased drastically: the number of mobile phone subscribers has increased over fifty-fold from 1.7 to 118.8 (per 100 people); the number of Internet subscribers has increased over twenty-five-fold from 0.5 to 13.8 (per 100 people); and the number of people with personal computers has more than doubled from 1.8 to 4.5 (per 100 people).

- The level of ***ICT usage*** (i.e. number of computer equipment, number of Internet users, number and size of ICT companies) is above average in Kyiv, Donetsk, Dnipropetrovsk, Kharkiv, Zaporizhia, Odessa and Lviv regions. For the country as a whole, for example, mobile telephone usage has increased from 49 to 156 minutes/user/month between 2000 and 2007.

- The ***telecommunication infrastructure*** is developing rather successfully. The main service provider – JSC Ukrtelecom – has created a national data communications network based on modern DWDM technology. The capacity of the network is 18 Gbps. At present, JSC Ukrtelecom's multiservice network has a central station in Kyiv and connects with speeds of 2.5 Gbps to 20 regional sub-stations

[4] Ukraine: Economic Assessment.- OECD, Paris, 2007, 114 p.
[5] Ukraine: Economic Assessment.- OECD, Paris, 2007, 114 p
[6] http://www.weforum.org/pdf/gcr/2008/rankings.pdf
[7] http://devdata.worldbank.org/ict/ukr_ict.pdf

including Dnipropetrovsk, Donetsk, Odessa, Lviv and Kharkiv. The service is able to provide quality information-communication services, including Internet, to all regions of Ukraine. As a result of the expansion of the telecommunication network and the implementation of new technologies, the number of Ukrainians regularly using the Internet has increased to 8 million people by 2009 (with over half of them located in Kyiv).

- Until recently, much of the ***computer equipment*** owned by state authorities was outdated: in 2007 approximately 58% of the existing computer equipment was based on out-of-date microprocessors. However, in the same year, 74% of new purchases were based on modern microprocessors and a further 14% utilised supercomputing equipment. Consequently, there is a move to modernise. Furthermore, over 100 higher education institutions and teaching organizations offer graduate and postgraduate education via about 4000 distance learning courses.

- With respect to ***e-Governance***, Ukraine tends to be a low-to-medium performer when compared to other countries. In the United Nations e-Government Survey 2008[8], Ukraine was ranked 41st out of 70 countries (above Russia in 60th position!). According to the 2007 *"e-readiness" ranking* of the Economist Intelligence Unit[9], which takes into account about 100 quantitative and qualitative indicators, Ukraine was ranked 60th out of 69 countries.

In 2007, the ***overall national ICT market*** amounted to 53.9 billion UAH (approx 5 billion Euro) and experienced 24.3% year-on-year growth and is comprised of: a) communication services (74% market share with 19% year-on-year growth), b) computation and equipment sales (21% market share with 41.5% year-on-year growth) and c) IT activity (5% market share with 45.5% year-on-year growth). Meanwhile, average annual expenditure on IT-services and communication per inhabitant increased by 21.9% to 350 UAH (approx 33 Euro). ICT makes a growing contribution to the nation's gross domestic product. Between 2003 and 2007, the share increased from 4.6 to 6.5% contributing 7.8 billion UAH (approx 730 million Euro) of taxes, fees and compulsory payments to the state budget. Today, over 480,000 people are employed in the ICT sector, or 2.1% of the total working population.

With regard to ***ICT related trade***, based on the World Bank's "ICT at a Glance" data[10], the relative amount of ICT goods exported (i.e. % of total goods exported) has slightly increased from 1.3 to 1.5. Importantly, ***Ukraine is emerging as a low cost hub for high quality software development***. This is reflected in the relative amount of ICT services exported (i.e. % of total services exported), which has increased over 40% from 2.5 to 3.6 between 2000 and 2007.

Exported ICT services include IT consulting, integration, software re-engineering, software testing and outsourcing. This highlights the significance of highly skilled labour in Ukrainian IT export. According to Market-Visio/Gartner, export of Ukrainian IT services grew from $100m in 2004 to over $200m in 2007. About 1900 companies work in this market segment. Sales orders to Ukrainian software companies come mainly from the USA, Canada, Germany, France, Israel, and Russia. However, according to State Committee on Statistics, the official total figure for software export in 2007 was only $4.7m due to the lack of a standardized system of indicators to monitor the national ICT sector development and, consequently.

Finally, ***ICT related entrepreneurship*** also makes an important contribution of sector performance. In 2007, there were 3121 entrepreneurs[11], who generated combined revenues exceeding 2.7 billion UAH (approx 250 million euros) and employed 30,492 regular workers and 3897 indirect workers. Annual foreign direct investment in ICT in Ukraine is growing: $21m (2006) and $37m (2007).

[8] See http://unpan1.un.org/intradoc/groups/public/documents/un/unpan028607.pdf
[9] See http://graphics.eiu.com/files/ad_pdfs/2007Ereadiness_Ranking_WP.pdf
[10] http://devdata.worldbank.org/ict/ukr_ict.pdf
[11] Source: State Statistics Committee

2.2 National Policy Objectives and Trends

2.2.1 Objectives and Targets of National ICT Policy

Currently, the main objectives and targets of national ICT policy have been defined in the Law of Ukraine "*On basic principles of information society development in Ukraine for 2007-2015*". Tasks regarding the implementation of ICT policy were defined by the Direction of the Cabinet of Ministries of Ukraine (August 15, 2007, No 653-p) "*On approval of the Action Plan to realize the tasks set by the Law of Ukraine 'On basic principles of information society development in Ukraine for 2007-2015'*". Already, technical changes have been made to this document by Decree of the Cabinet of Ministries on 13 May 2009 № 512-p. The changes concerned the rescheduling of specific tasks and the establishment of the State Agency on Science, Innovations and Information as the main executor of these tasks.

The most important national ICT projects are defined in the ***National Programme of Informatization***. The actual list of national projects, and the funding they receive each year, is confirmed by a separate Decree of the Cabinet of Ministries.

In general, it is difficult to speak of an "overall" national ICT policy strategy, because there are frequent priority and funding changes. Consequently, ***there is a big gap between original stated ICT policies and targets and what is actually achieved.*** In fact, this is a general problem in the domain of innovation development in Ukraine. However, there are some expectations that the situation will change since with the Parliamentary hearing on 17 June 2009 concerning the "*Strategy of innovation development of Ukraine for 2010–2020 under the conditions of globalization challenges*".

Starting in 2000, Ukraine has implemented a number of successful measures to establish the legal foundations for an information society and ICT sector. In this respect, the laws of Ukraine "*About e-documents and e-documents circulation*" and "*About electronic digital signature*" have been adopted and also the corresponding normative documents for realization of conceptual issues of these laws have been prepared. Also, the conception of a national e-information resources system was defined in the Decree of the Cabinet of Ministries on 31 December 2003 N 828-p. and legislation in the sphere of intellectual property has been improved.

In 2003, when the World Bank awarded a $5m loan to implement the e-Development Project in Ukraine, the Bank noted: "*... in Ukraine, the use of ICTs in everyday life, especially relating to the Internet, is still in an early stage of development. Currently, the ICT sector in Ukraine is characterized by a lack of an appropriate legal and regulatory framework, which validates online transactions; undeveloped infrastructure and logistical systems; comparatively expensive access to the Internet; and poor local content development*"[12].

Today, it is fair to say that the situation has significantly improved and the country has ambitious ICT goals. In recent years, state authorities and local government institutions have made efforts to develop an information society and to implement up-to-date ICT infrastructure in many spheres of social life.

Currently, the ***main strategic targets*** of information society development in Ukraine include:

- Acceleration of development and implementation of up-to-date competitive ICT in all spheres of social life, particularly into the economy of Ukraine and into state authorities and local governmental institutions activities;
- Assurance of computer and information literacy of the population, primarily by creating an education system that extensively uses modern ICT equipment;
- Development of national information infrastructure and its integration with world infrastructure;
- State maintenance of new "electronic" economic sectors (commerce, finance and bank services etc);
- Creation of nationwide information systems, primarily in the sphere of health care, education, science, culture, environment protection;
- Preservation of Ukraine's cultural heritage through the use of e-documenting;
- Extension of ICT usage for state management, relations between state and population, e-forms of interaction between public authorities / institutions and physical persons;
- Achievement of effective participation of all regions in the processes of information-oriented society in

[12] http://lnweb90.worldbank.org/eca/eca.nsf/General/3C15888B2F9BF63D85256D1F004A14B6?OpenDocument

the way of decentralization and approval of regional and local initiatives;
- Development of data protection for citizens, primarily regarding information availability, protection of information about a person, approval of democratic institutions and mitigation of risks "information inequality "; and
- Improvement of information security through the use of up-to-date ICT equipment and services.

There have been no changes concerning the definitions of ICT policy objectives/targets during the past two years. Most activities have been carried out in accordance with the Direction of the Cabinet of Ministries of Ukraine from 15 August 2007 N 653-p "*On approval of the Action Plan to realize the tasks set by the Law of Ukraine 'On basic principles of information society development in Ukraine for 2007-2015'*". The activities that have been carried out include:

- Creation of the Interbranch Council on Development of information Society;
- Increased funding of the National Programme of Informatization during 2007-2008;
- Implementation of the pilot projects "e-Government" and "e-Region";
- Development of proposals regarding national systems of indicators of information society development and a system of state observation, in order to create a monitoring system of information society development.

ICT policy is mostly discussed during meetings of the community board of the State Committee of Informatization and during meetings of the scientific-technical council of the National Programme of Informatization. Specific questions regarding the regulation of relations between state bodies and ICT market players are discussed and analysed by key ICT stakeholders.

The Concept of e-government in Ukraine till 2015 was approved on 13 December 2010 within the session of the Cabinet of Ministries of Ukraine. The Concept will be implemented in three stages. Unique, harmonized with international standards of interaction of e-government subjects and a single state system of e-documents-flow is planned to be created.

The implementation of a project to establish a technology transfer network in Ukraine is still on-going. It unites centres of technology transfer of Ukraine, and is an active instrument of an innovative infrastructure. The network assists in information on technology market development exchange and also to find partners to implement innovation projects in Ukraine as well as abroad.

A temporary programme-technological complex is in action in order to implement the national system of e-document flow using digital e-signature.

Exhibit 5: National ICT policy objectives

Objective	To be achieved by (year)
Increase funding of National informatization programme including all programmes and projects on informatization that funded by budget funds.	2010-2015
Develop and implement the National system of indicators of information society development	2007-2010
Make amendments in the system of state statistic observation in order to create a system of monitoring of information society development	2009
Implement a law project entitled "Information law book for Ukraine"	2009
Implement a law project entitled "Law of Ukraine about e-commerce"	2009
Prepare projects of normative legal acts on implementation of mechanisms and orders of providing information services by executive authorities and local bodies for physical persons and legal bodies via Internet	2008-2010
Prepare projects of normative legal acts on determination of basis of implementation and functioning of e-exchange systems, auctions and depository	2010
Bilateral agreement undertaking about mutual recognition of code certificates in ICT sphere, primarily with EU countries	2007-2010
Create and assure putting into operation a network of digital land television, radio broadcasting	2008-2015

Objective	To be achieved by (year)
Work up guidelines on building on telecommunication basis of information infrastructure according to EU standards	2008-2015
Prepare proposals regarding implementation of systems ”e-Ministry” and “e-Region” in central and local bodies of executive power	2009-2010
Assure the implementation and functioning systems of e-document circulation and e-digital signature in all central bodies of executive power, Council of ministries of Autonomous republic of Crimea, regional, Kyiv and Sevastopol local public administration.	2007-2010
Form a nationwide network of distance learning using e-library stocks on the basis of education and scientific-research institutions	2010-2015
Implement pilot projects on: • Informatization of health protection including telemedicine; • Creation of The only data base of cultural values approachable via Internet; • Creation and functioning of The only information-telecommunication system of law machinery; • Implementation of information-communication technologies into the publishing field; • Formation of national infrastructure of geospatial data; • Data base creation of personnel records of public officers and officers of local government; • Creation of a system of monitoring and forecasting of natural environment condition within a State water management system; • Creation of information-analytical system of forest management on the basis of geo-information technologies; • Informatization of local government institutions activity.	2007-2011

2.2.2 Recent National Policy Trends

Currently, ***national ICT policy development*** is mainly focussed on the following areas:

- improving the implementation and performance of projects under the National Programme of Informatization;
- creating a favourable investment climate for ICT developments;
- supporting the advanced development of basic and applied research and knowledge-based technologies;
- supporting development of the domestic software programming industry and ICT manufacturing industry;
- developing national, branch and regional information systems, networks and e-resources, information-analytical systems of executive authorities and local government institutions.

In the State Committee of Informatization’s action plan for 2009, the following issues have been highlighted:

- absence of an officially recognized system of ICT indicators to support state policy and state management; development of effective monitoring and evaluation in the sphere of ICT;
- insufficient coordination of efforts between the state and private sectors;
- delays in the implementation of effective e-governance technologies, formation of national e-information resources and repository

In order to address these issues, the following ***tasks*** have been identified:

- Develop the draft plan for a new law that describes a new national ICT development programme that takes into account the 10 years of experience with the current National Programme of Informatization;
- Develop the draft plan for a new law concerning:
  - e-commerce
  - access to information
  - “*About nationwide implementation programme of e-document circulation using e- digital signature*”

- regulatory legal act regarding functioning of information system "*e-Government*",
- action plan regarding the implementation of e-system "*e-Ministry*" in central executive bodies
- technical regulations of implementation and functioning of systems of e-document circulation and e-digital signature
- creation of a national repository of e-information resources
- formation of the only rules of activity within information sphere and information space (including within Internet) for all market actors notwithstanding the technical solutions

- Ensure and increase funding for the National Programme of Informatization;
- Develop an action plan regarding development of the domestic software industry;
- Develop and implement a national system of ICT indicators;
- Introduce changes to the system of state statistic observation, in order to create an information society development monitoring system that will be used during the next population census.

Exhibit 6: ICT Policy Measures

IPM N°	Title	Organisation responsible
UA_1	National Programme of Information Society Development in Ukraine	State Committee on Information Society Development
UA_2	Direction of Cabinet Council "On approval of National Programme of Information Society Development in Ukraine task (project) list of 2002, their state employers and amounts of financing" No 323-R from 13.06.2002	Cabinet of Ministries of Ukraine
UA_3	The programme "Information development of general education and vocational schools, equipment with computers of general education schools primary in country-side, providing educational institution with modern technical means of education in natural-mathematical and technique subjects" in National Budgets of 2003-2006	State Committee on Information Society Development
UA_4	Decision of Presidium of National Academy of Sciences of Ukraine "On approval of programme "Development of efficient intelligent high performance computers and means of information protection (Intellect)" No 308 from 24.12.2003; the programme "ICT in education and science on years 2006-2010" in National Budgets of 2006-2008	Department of Information National Academy of Sciences of Ukraine
UA_5	Laws of Ukraine "On electronic documents and electronic document circulation" and "On electronic digital signature" enforced by Decision of Supreme Rada of Ukraine No 3175 from 01.12.2005 "Recommendations of Parliament hearings on issues of information society development in Ukraine"	Ukrainian parliament (Verkhovna Rada)
UA_6	Law of Ukraine "On telecommunications" and approval of "Conception of development of telecommunications till 2010" (2006)	Ukrainian parliament (Verkhovna Rada)
UA_7	Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015	Ukrainian parliament (Verkhovna Rada)
UA_8	Direction of the Cabinet of Ministries of Ukraine from 15 August 2007 N 653-p "On approval of the Action Plan to realize the tasks set by the 'Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015'"	Cabinet of Ministries of Ukraine

Further detailed information concerning the above policy measures can be found in Annex 2.1.

3 What lessons can be drawn from Policy Implementation?

3.1 Lessons from the Evaluation of ICT Policy Measures

In general, the actions implemented in Ukraine for the ICT sector development were efficient in both the manufacturing and service domains: a set of electronic industry businesses has been developed and a significant number of enterprises produce software, demonstrating Ukraine's own research and engineering potential. The achievements of Ukrainian researchers in some areas (such as discrete mathematics, methods of optimization, computer learning theory and pattern recognition, and modelling of physical processes) are known across the world. However, the achievements in system analysis and in the development of cluster supercomputers and intelligent IT to solve trans-computational complexity problems is less well known outside of the former Soviet region.

In 1998, based upon ideas of Academician Victor Glushkov, the Institute of Cybernetics of the National Academy of Sciences proposed the state scientific and technical policy, in order to develop the country's information society. This provided the opportunity to pass the basic "*Law on Conception and National Programme of Information Society Development in Ukraine*" (hereinafter referred to as NPI). As a national goal-oriented programme, NPI comprises of individual tasks (projects) planned for a fixed time period and aimed at implementing state ICT policy in coordination with a socio-economic programme for the country's development. Over the period 2000-2008, six NPIs were executed.

The NPI concept has been recently revised to determine for the next 10 years the priorities of state ICT policy, defining NPI as a mechanism for policy implementation. Based upon the assumption of global information society development trends, Ukraine considers the establishment of such a society on its territory as one of the main national priorities (as stated in the "*Law on the Main Foundations of Information Society Development in Ukraine in 2007-2015*" of 9.01.2007 No 537).

Moreover, during the past 5 years, the legal basis for ICT development in Ukraine has been extended. Basic laws concerning electronic document circulation and digital signature, telecommunications, and foundations of information society development have been implemented, while the need to harmonise the ICT law codex with EU legislation was evident. For example, legislation on e-commerce that is foremost harmonized with the Directive 2000/31/EU is still absent.

Meanwhile, the insufficient number of national ICT standards harmonized with ISO/IEC and CEN/CENELEC standards, is restraining the export potential of Ukrainian ICT. Such harmonization will reduce the price of ICT products and services and speed up the development of quality national standards as well as efficiently help Ukraine to enter the global information space. But, during the past 10 years, fewer than 200 national ICT standards have come into operation. This negative tendency will be continued if, low budget projects for the ICT standardization are included in the NPI (currently projects with budget less than $12000/year are included).

In general, trying to accelerate information society development is complicated by the country's relatively weak economy. According to the indicator "*ICT Expenditure/GNP per capita*", Ukraine occupies last position in Europe and is well behind neighbouring new EU member states for all major ICT indicators (such as "*density of territorial coverage and capacity of communication and computer networks*", "*number of Internet users per 100 citizens*", "*relative proportion of Broadband Internet users*", etc). Looking closely at the structure of ICT expenditure per capita for Ukraine, telecommunication services dominate and there is an uneven distribution of Internet users (mainly concentrated in Kyiv and Kyiv region).

An insufficient level of investment - especially Foreign Direct Investments – further reduces the ICT market development rate in Ukraine. Factors stifling investment include the lack of encouraging financial and tax conditions, political instability, and now also economic recession with regular foreign prophesies of Ukraine defaulting on its national debt.

Up till now the general state of Ukrainian ICT is well behind that of other developed countries. The lack of consistently applied state policy has resulted in the spontaneous development of individual fragments of information society mainly in the field of general-purpose telecommunications and e-government.

3.2 Review of Good Practice

Examples of good practice in ICT policy making and implementation from 2000 onwards are presented below. The Exhibit summarises the examples that subsequently are examined in greater detail.

Exhibit 7: Summary of good practice cases in Ukraine

No	Year	Title of good practice case	Justification for selection
1	2002	Direction of Cabinet Council "*On approval of\ National Programme of Information Society Development in Ukraine (NPI) task list of 2002, their state employers and amounts of financing*", No 323-R from 13.06.2002	▪ A set of actions and measurements of NPI was established. ▪ The development of electronic industry was accelerated. ▪ State agencies were equipped with modern computers boosting e-government advances during following years.
2	2003	The programme "*Information development of general education and vocational schools, equipment with computers of general education schools primary in country-side, providing educational institution with modern technical means of education in natural-mathematical and technique subjects*" in National Budgets of 2003-2006	▪ Town and village schools were equipped with modern computers. ▪ New educational techniques were introduced. ▪ Local PC marked was extended.
3	2004	Decision of Presidium of National Academy of Sciences of Ukraine "*On approval of programme "Development of efficient intelligent high performance computers and means of information protection (Intellect)'"*", No 308 from 24.12.2003; the programme "*ICT in education and science on years 2006-2010*" in National Budgets of 2006-2008	▪ Ukrainian HPC cluster computers were developed and promoted. ▪ A local market for cluster computers was created. ▪ Industrial production of cluster computers started.
4	2005	Laws of Ukraine "*On electronic documents and electronic document circulation*" and "*On electronic digital signature*" enforced by Decision of Supreme Rada of Ukraine No 3175 from 01.12.2005 "*Recommendations of Parliament hearings on issues of information society development in Ukraine*"	▪ National system of digital signature was launched. ▪ Some initiatives in electronic document circulation were initiated by state agencies.
5	2006	Law of Ukraine "*On telecommunications*" and approval of "*Conception of development of telecommunications till 2010*" (2006)	Accelerated development of communication networks and Ukrainian segment of Internet
6	2007	Law of Ukraine concerning "*Main Priorities for Development of an Information Society in Ukraine for 2007-2015*" and Direction of Cabinet Council "*On approval of action plan on execution of tasks envisaged by Law of Ukraine concerning "Main Priorities for Development of an Information Society in Ukraine for 2007-2015'"*", No 653-R from 15.08.2007	▪ Further development of e-Government. Regulation of state information resources started. ▪ A renewed system of indicators for monitoring and controlling information society development has been created.

<u>Good Practice Case #1</u>: Direction of Cabinet Council "*On approval of National Programme of Information Society Development in Ukraine (NPI) task list of 2002, their state employers and amounts of financing*" No 323-R from 13.06.2002

The processes for establishing an information society are developing in Ukraine but not as rapidly as was planned in the 1998 Law of Ukraine "On Conception and National Programme of Information Society Development in Ukraine". At that time, the basis for new, high-quality, organizational means to access common information spaces on national and global levels had yet to be understood. According to these principles, a relatively small set of science absorbing intelligent IT can provide the means for mass access of the population to world electronic and information resources, knowledge and culture variation.

Exhibit 8: Aggregated financial data of NPI and budget programmes for ICT support of individual state agencies (not included in NPI) from the Ukraine State Budgets of 2002-2008[13]

Year	Approval from Direction of Cabinet Council of Ukraine	NPI programme budget for ICT support			State agencies programmes budget ICT support				
		Financing ('000s USD)			Number of the programmes	Financing ('000s USD)			
		Planed	Actual	%		Planned	Actual	Including IT projects	%
2002	DCCU 323	1,584	298	19%	14	48,056	0	0	0
2003	DCCU 414	1,703	1,703	100%	16	40,254	28,197	28,197	100%
2004	DCCU 181	1,527	955	63%	26	136,265	100,665	54,543	54%
2005	DCCU 329	1,707	1,539	90%	22	58,141	40,996	12,725	31%
2006	DCCU 552	1,785	1,244	70%	24	110,913	61,271	52,189	85%
2007	DCCU 805	1,785	1,660	93%	21	115,615	92,313	61,944	67%
2008	Project (Q1-Q2)	1,785	Not available	-	19	113,497	Not available	Not available	-
Total:		**11,875**	**7,399**	**62%**	**142**	**622,744**	**323,442**	**209,598**	**65%**

The Exhibit below shows this principle with the example of the last NPI of 2007 approved by Direction of Cabinet Council of Ukraine (DCCU) No 805.

Exhibit 9: Planned budget distribution for ICT support in 2007 (by main directions)

#	Priority directions	A. NPI program		B. State agencies programmes	
		Number of projects	Financing ('000s USD)	Number of projects	Financing ('000s USD)
1	Policy forming and organizational-legal support	6	273	1	1,653
2	National infrastructure forming	6	349	1	416
3	ICT support of strategic state development sectors, state security and defence	12	800	7	23,737
4	ICT support of social-economic development processes	2	141	2	22,421
5	ICT support of finances and monetary systems, the finance-economic state control	1	54	5	51,992
6	ICT support of social sphere	1	38	1	7,156
7	ICT support of ecology and use of natural resources	0	0	3	2,877
8	ICT support of science, education and culture	2	130	1	5,363
Total:		**30**	**1,785**	**21**	**115,615**

The results of execution of individual projects of an NPI programme, and of similar programmes for ICT support of individual state agencies, were annually estimated by the Cabinet Council on the basis of reports of the Director of the *Department of Communications and Information Society Development* under the Ministry of Transportation and Communications. The Department ruled NPI till the appearance in 2008 of the State Committee on Information Society Development directly subordinated to the President of Ukraine.

Electronic industry (2002, 2003, 2004). The electronic industry mainly consists of private companies producing computer hardware based on foreign components for local demand. The market segment of mobile computers - from PDA to notebooks - is substantially occupied by foreign brands. Peripheral devices are not produced at all except for specialized ones. However, in other segments (PC, servers, clusters), imports only dominate the high end of the market. Having abandoned hopes to produce components or repair parts for either domestic or international markets, the Ukrainian electronic industry has concentrated

[13] Annual Reports of 2004-2006 and 2008 of Chairman of State Committee on Information Society Development, http://dki.gov.ua/repository/36/file/5_12PHD.doc

on providing the widest variation of modern computers for local consumers.

Despite an increasing number of modern computers, there is yet to be a significant rise in PC penetration level. Currently, there are slightly more than 13 computers per 100 citizens in Ukraine. According to this indicator, Ukraine is still far behind from Central Europe and occupies one of the last positions in the region. For example, it is estimated that the current level of Poland (26 PC per 100 citizens) will be reached no earlier than the end of 2010, even if the effect of the recession is discounted.

On the other hand, the level of household computerization is traditionally one of the most important indices of information society development. Since 2002, the number of households which have PCs at their disposal has risen. According to *State Committee on Statistics*, the level has risen from 11.5% in 2006 to 16.4% in 2008 based on computer sales, while estimates made by other agencies suggest slightly different figures: from 11% given by iKS-Consulting to 20% announced by GFK Ukraine.

Since the approval of "*Software Legalization Conception*" in 2003 and the introduction of coordinated actions - primarily awareness raising work with young people - the organized fight against computer piracy has been raised. With the goal of stopping counterfeit software distribution, the Ministry of Education and Science concluded in May 2005 a treaty on the legalization of used computer programmes produced by Microsoft Corporation. As more actions are yet necessary to ensure license purity of software used by state agencies, the drafts of similar software legalization agreements were prepared in 2008 for companies ABBY, Adobe, Corel, Borland, PROMT, Graphisoft, Nero, Doctor Web and Kaspersky Laboratory.

Computer equipment of state agencies (2002). Today, insufficient financing alone is a barrier to the upgrade to modern computer systems and application software. The existing network of distributors of well-known foreign software vendors completely covers Ukrainian demand and proposes new commercial versions of the software. In order to compete with the still existent pirate market, main vendors offer large discounts for Ukrainian customers.

The Exhibit below contains data of software procurement by state agencies. The total budget for information society development is indicated next to that allocated to software development and maintenance etc. The table confirms that the central state executive agencies direct most of their ICT budget financing towards developing information society infrastructure, instead of supporting and developing information resources and information analytical systems, which could increase the quality, efficiency and transparency of state managerial processes.

Exhibit 10: Software procurement by state agencies[14]

Financing from State Budget ('000s USD)	2005	2006	2007
Total for the information society development	56,079	50,792	61,921
Software development	1,344	2,026	3,103
Software maintenance and support	1,269	2,849	889
Purchase of licensed software	198	3,651	4,770

Good Practice Case #2: The programme "*Information development of general education and vocational schools, equipment with computers of general education schools primary in country-side, providing educational institution with modern technical means of education in natural-mathematical and technique subjects*" (2003)

Education in Ukraine has made a major leap into the 21st century thanks to ICT. According to data from the *State Statistics Committee*, the number of ICT specialists graduating from Higher Education Institutions grows annually but still remains relatively low – only 2.83% of the total number of graduates. Altogether, over 50,000 qualified IT-professionals and mathematicians graduate annually from national universities.

[14] Annual Reports of 2004-2006 and 2008 of Chairman of State Committee on Information Society Development, http://dki.gov.ua/repository/36/file/5_12PHD.doc

The relative number of computers in schools has increased considerably between 2003 and 2007 as the Exhibit below clearly illustrates. To accommodate for various educational disciplines, over a 100 different types of pedagogical software are installed in school computers.

Exhibit 11: Computerization level in schools, by regions of Ukraine[15]

Region	Number of computers not older than 10 years		New computers in 2007	Students per computer	
	2003	2007		2003	2007
AR of Crimea	366	736	72	46	19
Vinnytsa	517	1018	129	40	18
Volynska	371	494	40	31	20
Dnipropetrovsk	590	1423	180	66	24
Donetsk	536	1794	418	111	27
Zhytomyr	172	588	136	65	19
Zakarpatska	133	357	54	79	25
Zaporizhzhia	521	1093	222	48	18
Ivano-Frankivsk	311	585	48	40	20
Kyiv	385	615	60	37	19
Kirovograd	228	509	107	54	20
Lugansk	711	1535	306	50	20
Lviv	520	1294	143	63	25
Mykolaiv	205	527	57	75	28
Odessa	361	874	107	48	19
Poltava	263	682	163	65	23
Rivne	469	698	67	21	16
Sumy	197	566	100	77	22
Ternopil	215	489	97	52	24
Kharkiv	506	1015	145	53	21
Kherson	297	683	70	40	16
Khmelnytsk	303	596	121	48	24
Cherkasy	266	513	67	39	20
Chernivtsi	204	354	32	35	19
Chernigiv	227	435	50	45	19
Kyiv City	586	1143	205	33	16
Sevastopol City	113	250	87	29	13
Total in Ukraine	**9,573**	**20,846**	**3,283**	**51**	**21**

Over 70% of all schools have Internet access, among them 55% of village schools (in 2007 - around 40%). Two scientific educational networks are concurrently functioning in Ukraine: URAN (Ukrainian Research and Academic Network, since 1998, integrated with GEANT) and Urnet.

According to data from the *Ministry of Education and Science*, in 2008, some 2,500 more computers were installed in Higher Education Institutions of 3rd to 4th accreditation levels (see Exhibit below). Also, a significant number of libraries now have their own local computer networks whilst electronic library stocks grow annually and now total over 145,000 items. Unified software for keeping electronic scientific libraries and archives has been deployed.

[15] Annual Reports of 2004-2006 and 2008 of Chairman of State Committee on Information Society Development, http://dki.gov.ua/repository/36/file/5_12PHD.doc

Exhibit 12: Number of computers in educational institutions[16]

Educational Institution category	Number of computers by the end of the year	
	2006	2007
1st – 2nd level (secondary school and secondary technical institutions)	15,398	15,900
3rd – 4th level (high school)	70,628	72,630
Total	**86,026**	**88,530**

A bank of attested distance learning courses has been created for secondary, professional, technical and higher educational institutions and post-graduate educational institutions. A programme for the creation of electronic educational textbooks and encyclopaedias was started in 2007 and currently approximately 50 are in the final stage of implementation.

In the course of Ukraine joining the Bologna process, the Ministry of Education, Science, Youth and Sports has significantly modernized the nomenclature of educational IT-disciplines and is deploying programmes for advanced training for both teachers and industrial professionals (secondary higher education).

Good Practice Case #3: Decision of Presidium of National Academy of Sciences of Ukraine "*On approval of programme "Development of efficient intelligent high performance computers and means of information protection (Intellect)""* (2004)

During the past 5 years, under the coordination of the unified Programme of the National Academy of Sciences (NAS) of Ukraine, a Ukrainian cluster of supercomputers have been established that allow parallel computations on nodes of sub-local network. Since 2004 there has been a progress in development of cluster computer complexes and now there are around 15 functioning clusters (http://grid.org.ua) on the university level. The clusters are inter-connected by high-performance (10 Gbit/s) optical fibre network Urnet (Kyiv-Lviv-Kharkiv) and connected also to international nodes in Russia and Poland (20 Gbit/s). The fibre network has been built by the National Academy of Sciences with funding from both state and international grants.

Now Ukraine has an Enterprise-level infrastructure for building patent-free native cluster complexes. The state Enterprise "Electronmash" and the Gluskkov Institute of Cybernetics of NAS of Ukraine have jointly developed industrial-ready samples of Cluster family Inparcom-32, -64, -128, -256 (see Exhibit 14) with intellectual software for distributing computations into parallel systems.

An approach has been developed for using the clusters towards solving certain classes of problems having trans-computational complexity. To achieve this, an open software product has been developed (for nuclear physics, quantum mechanics, space research and aviation, meteorology, ecology, economics, strength modelling for various designed objects, genetic engineering and molecular biology, geophysics and prospecting deposits, etc.)

A programme for development of the National Grid Infrastructure has been elaborated. This programme will enable mutual usage of and simplified access to distributed informational and computational resources. It is projected to integrate the National Grid Infrastructure into the European one in order to promote the results of the current EGEE-project in Ukraine. The "Enabling Grids for E-sciencE" connects 15000 supercomputers of various powers and is developed by 200 organizations from 30 European countries and also in cooperation with national Grid-infrastructures of USA, Japan, South Korea, etc.

[16] Annual Reports of 2004-2006 and 2008 of Chairman of State Committee on Information Society Development, http://dki.gov.ua/repository/36/file/5_12PHD.doc

Exhibit 13: Summary of Ukrainian High Performance Computer Clusters (up to early 2009)

#	Place of installation, owner, year developed	CPUs/ cores	Architecture	Productivity , GFlops	Disk warehouse
1	Kyiv, Glushkov Institute of Cybernetics of NAS of Ukraine, own design, owner, 2004. In 2008 it was ranked 15 in TOP-50, among most powerful Clusters from Russia, Ukraine and Belarus (http://supercomputers.ru/)	250 /704	nodes: 74 (2xXeon 5160 3 GHz 8.192 GB RAM) nodes: 51 (2xXeon EM64T 2.33 GHz 16.384 GB RAM) network: InfiniBand /Gigabit, Ethernet /Gigabit, Ethernet	5317 / 7354.5	25 Tbytes
2	Kyiv, NTUU "KPI". Developed in 2007. In 2008 was ranked 22 in TOP-50	168 /336	nodes: 84 (2xXeon 5160 3 GHz 4.096 GB RAM) network: InfiniBand /Gigabit, Ethernet /Gigabit Ethernet	3130 / 4032	5 Tbytes
3	Kyiv, Glushkov Institute of Cybernetics of NAS of Ukraine and “Electronmash” State Enterprise, 2008, own design, owners	64/256	Intel Code Duo Xeon 5300 2.66 GHz	1854 / 2400	4 Tbytes
4	Kyiv, Glushkov Institute of Cybernetics of NAS of Ukraine and “Electronmash” State Enterprise, 2007, own design, owners	32/128	Intel Code Duo Xeon 5300 2.66 GHz	970 / 1200	2 Tbytes
5	Kyiv, Glushkov Institute of Cybernetics of NAS of Ukraine and “Electronmash” State Enterprise, 2007, own design, owners	16/64	Intel Code Duo Xeon 5300 2.66 GHz	486 / 600	1 Tbytes
6	Kyiv, Glushkov Institute of Cybernetics of NAS of Ukraine and “Electronmash” State Enterprise, 2006, own design, owners	32/32	Intel(R) Xeon(R) CPU 2.33GHz	161 / 205	500 Gb
7	Kharkiv, Institute of scintillation materials of NAS of Ukraine	88	Intel(R) Xeon(R) CPU 2.33GHz		355 Gb
8	Kyiv, Institute of Space Researches of NAS of Ukraine	20	2xAMD(R) Opteron(TM) CPU 2.80GHz		23 Tbytes
9	Kyiv, Bogolyubov Institute of theoretical physics of NAS of Ukraine	80	2xIntel(R) Xeon(TM) CPU 2.80GHz		3 Tbytes
10	Sumy, Institute of Applied Physics of NAS of Ukraine	32	Intel(R) Xeon(TM) CPU 3.20GHz @		300 Gb
11	Kyiv, Institute of Cell Biology and genetic engineering of NAS of Ukraine	32	Intel(R) Xeon(TM) CPU 3.20GHz		100 Gb
12	Kharkiv, Institute of Ultra-low temperatures of NAS of Ukraine	88	Intel(R) Xeon(TM) CPU 2.83GHz		
13	Kyiv, Institute of molecular biology and genetics of NAS of Ukraine	28	Dual Core AMD Opteron(tm) Processor 270		1 Tbytes
14	Kyiv, National Kyiv University	104	Intel(R) Xeon(R) X5355 @ 2.66 GHz		Tbytes
15	Kyiv, Main Astronomic Observatory of NAS of Ukraine	104	2 x Intel(R) Xeon(R) CPU 5130 2.00GHz		14 Tbytes
16	Kyiv, Geological prospecting Institute	24	Intel(R) Xeon(R) CPU 5130 2.30GHz		2 Tbytes
17	Kyiv, Geological prospecting Institute	10	Intel(R) Xeon(TM) CPU 3.0 GHz		250 Gb

Good Practice Case #4: Laws of Ukraine "*On electronic documents and electronic document circulation" and "On electronic digital signature*" (2005)

The national legislation in Ukraine fully corresponds with the provisions of the 1999/93/EC Directive on a Community Framework for electronic signatures. A National System for Electronic Digital Signature has been developed. Its infrastructure comprises the Central Certification Authority (since 05 July 2005) and 10 accredited Key Certification Centres (8 in Kyiv, one in Kharkiv, one in Dnipropetrovsk) serving at the beginning of 2009 over a million corporate and individual members. Some steps have started to be made in order to support cross-certification and mutual recognition of certificates and trans-border exchange of electronic documents with other countries, firstly with Russia and Belarus. As the National System only grants integrity and irrefutability of electronic documents, but not confidentiality thereof, the State authorities and organizations widely use the national system of confidential communications for electronic document exchange.

The programme for the development of the National System for Electronic Digital Signature up to 2011 has been adopted by the government as the draft law "*On the Nation-wide programme for introduction of electronic document exchange with the use of electronic digital signature*". This draft law has been waiting for approval by the Ukrainian Parliament for 2 years. For the needs of electronic document exchange and in order to simplify and speed it up, the state authorities have started developing formats and data protocols, in particular the Tax Administration, State Statistics Committee, and Pension Fund. Currently, the President's Secretariat, Cabinet of Ministers and the Parliament machinery are actively developing the electronic document exchange.

It is worth noting that Ukraine was the first CIS state to start industrial usage of electronic interbank payment system in 1994. Electronic digital signatures for securing electronic payment documents was first used in 1995 and the National Bank established the first Key Certification Centre. The electronic payment system is being constantly improved: in 2006 a new generation system was introduced for centralized processing of mass electronic payments simultaneously for interbank exchange and servicing magnetic cards.

Good Practice Case #5: Law of Ukraine "On telecommunications" and approval of "Conception of development of telecommunications till 2010" (2006)

Through the Law "*On Telecommunications*" (effective 2005) and the "*Conception of Telecommunications development till 2010*" (approved 2006), the national priorities and directions for further development of general purpose communication networks have been determined, and the bandwidths of telecommunication and data transition networks have significantly increased. For example, telecommunication operators of all forms of ownership have put into operation 486,500 land phone numbers during 2007 and 76,300 during the 1st quarter of 2008. This work required just 20% of the annual telephony development budget whilst the remaining 80% was allocated to mobile communications. As a result, mobile telephone communications have rapidly become an affordable service in comparison to fixed ones.

The following Exhibit summarises key indicators for the Ukrainian telecommunications market.

Exhibit 14: The dynamics of general purpose networks development in 2007-2008

Parameter	2007	2008
The mobile telecommunication market	$1.6 billion (84.3% - self financing, 7.9% - foreign investments, 7.8% - other)	
Number of subscribers	49.0 million	55.6 million (+13.5%)
Penetration of mobile communication relative to total population of Ukraine	104.4%	119.2% (4.3 times exceeds the fixed telephony penetration)
Number of the UMTS standard base stations put into operation	537 base stations in 15 regions	210 base stations in 22 cities (of total 3,000 base stations)
Development of public Wi-Fi network (in airports, exhibition centres, education	272 hotspots put into operation (of total 528 hotspots in 329 objects)	164 hotspots in 134 objects put into operation during Q1

Parameter	2007	2008
institutions, cafe, hotels, etc.)		
Total income	$3.6 billion	$4.4 billion (+21%)
Services to population	$1.4 billion	$1.8 billion (+30%)
Communication services per capita	$31.7	$39.6 (+24%)
Income from inter-computer communications	100%	143%
Communication services: ▪ satellite ▪ cell phones ▪ Internet	 100% 100% 100%	 140% 126% 147%

According to the marketing agency SputnicMedia, during the last 7 years, the number of Internet users has almost doubled as to the number of mobile phone users which now exceeds the total population of Ukraine. This situation has arisen as a result of targeted pricing policy as well as the successful advertising actions of private operators to attract young people. Other operators and providers of network services have actively started to apply this experience in order to solve the issue of domestic demand for IT merchandises and services both in the private and state economy sectors.

Now most institutions, companies, public associations or persons use general purpose networks for data transmission. For the past 3-4 years, modern communication systems have been built and developed on the basis of new information transmitting technologies which provide quality and reliable communications. Multifunctional digital media networks, telecommunication systems of state and sectoral significance, corporative networks are created and integrated. A special information-telecommunication system of state executive agencies SITS has been created. Since 2007 SITS provides a separate subscriber subsystem for all the executive agencies.

With the goal of entering in the global information space, Ukraine actively installs global satellite telecommunication systems and participates in a set of international projects to build trunk fibre optic communication lines. The trunk and regional fibre optic lines of length 1,600 km have been built and put into operation including 275 km of fibre optic lines “Bukovyna” and “Podillia”. The satellite communication network of public corporation Ukrtelecom includes 22 satellite stations in 8 regions. The ATM network nodes work in 13 regions, and Frame Relay network cover all the provincial centres so the number of ATM/Frame Relay nodes is 392. ISDN services have been established in 15 regions.

At the beginning of 2008 the total power of trunk telephone networks was 6.2 billion channel-kilometres, the mounted capacity of local telephone communications was about 13 million with 62% fraction of digital networks for urban areas and about 40% for rural ones. The dominant operator Ukrtelecom developed a national trunk data transmitting network based on DWDM technology. The network total bandwidth is 18 Gbit/sec, the multi-service transportation network between central Kyiv node with Dnipropetrovsk, Donetsk, Odessa, Lviv and Kharkiv nodes have a bandwidth 2.5 Gbit/sec, and for the 20 other region centres it is 1 Gbit/sec.

As result of the communication and data transportation networks development, the number of Internet users has significantly increased. It has not happened as a result of great state financing but thanks to private investors who have introduced broadband Internet over cell telephony. With dense coverage of Ukrainian territory by stations from the three biggest mobile providers, enough bandwidth Internet connection exists almost anywhere. But low price Internet is still restricted to the (expanding) area of CDMA/UMTC, EDGE and fixed telephony covering. At the beginning of 2008, more then 4,200 shared access points - primary in the form of computer clubs and Internet cafe - provided Internet access for small Ukrainian towns (up to 50,000 inhabitants) and villages.

The next Exhibits illustrate the distribution and growth rate of Internet access across Ukraine.

Exhibit 15: Internet user breakdown according to regions of Ukraine[17]

#	Region	Quota, %
1	Kyiv (Kyiv)	59.33
2	Odessa	6.52
3	Dnipropetrovsk	5.52
4	Donetsk	5.13
5	Kharkiv	4.61
6	Lviv	3.51
7	Zaporizhzha	2.86
8	AR of Crimea	2.6
9	Other	9.92

Exhibit 16: Growth rate of active Internet users in Ukraine

#	Date	Total number of users in millions	Growth rate to previous point, %
1	January 2007	4.207	-
2	April 2007	4.820	14.57
3	July 2007	4.880	1.26
4	October 2007	6.091	24.80
5	January 2008	7.696	26.35
6	April 2008	8.406	9.24
7	July 2008	8.338	-0.83

Exhibit 17: Growth rate of private subscribers to broadband services[18]

#	Date	Number of users in millions	Growth rate to previous point, %
1	1 qtr, 2007	0.49	-
2	2 qtr, 2007	0.55	12.24
3	3 qtr, 2007	0.63	14.55
4	4 qtr, 2007	0.74	17.46
5	1 qtr, 2008	0.86	16.22

Exhibit 18: Growth rate of Internet access

#	Indicators of Access to the Ukrainian Internet segment	Year	
		2007	2008
1	Number of active Internet users (those having visited more than one page in a month) per 100 inhabitants	78.51% less than in 2008	18.0 (data by BIGMIR)
2	Total number of Ukrainian Internet users	70.82% less than in 2008	8,337,581 persons (data by BIGMIR)
3	Number of UA-IX providers having Internet traffic throughput of 1 Gbit/s	36 UA-IX participants out of 70	54 participants out of 90
4	Mean Internet traffic throughput in UA-IX	7-8 Gbit/sec	21 Gbit/sec
5	Total number of 3rd level domain names delegated to the .UA domain zone	39% less than in 2008	359,295

[17] Internet user breakdown by regions of Ukraine, 2008, Bigmirnet, http://i.bigmir.net/index/UAnet_global_report_072008.pdf
[18] Data Source: iKS-Consulting

In order to ensure best connectivity between Ukrainian providers' networks – i.e the shortest and most efficient traffic routing without the need to use international networks - the Internet traffic exchange network UA-IX has been established. At the beginning of 2009 this network connected about 90 participants from various regions of Ukraine. The Ukrainian network is a member of the Euro-IX International Association that incorporates 40 traffic exchange networks in 23 countries of the World aiming at development, growth and enhancement of the traffic exchange points (IXP) community. The UA-IX provides its participants new services, in particular: 10GE – exchange at the speed of 10 Gbit/s, Nx1GE – at 2, 3, 4 Gbit/s (EtherChannel), Nx10GE – at 20, 30, 40 Gbit/s (EtherChannel).

By 2009 the mean traffic throughput in UA-IX had grown by 2 to 4 times every year. In 2007, at the point of switching to 10 Gbit/s, mean traffic throughput had totalled 7 – 8 Gbit/s. The traffic speeds of participants have also been growing.

By August 2008, the Ukrainian Internet segment (the .UA domain zone) comprised of over 350,000 third level domain names. Meanwhile, the situation around the .UA domain zone address space management has become critical. Management of the domain zone has been performed from outside Ukraine by non-Ukrainians for over 8 years. A Coordination Council was founded in 2003 but it was not until 5 years later that it managed to appoint staff and start planning organizational and legal actions for taking over all the responsibilities for the .UA domain zone management. At the same time, the Government and other authorities explicitly neglect their governing functions: not playing any coordinating and stimulating role in forming prices for IT products and services and not proposing legislation for IT market expansion and price reduction.

In general, there is some technical inferiority in communication systems and data links with insufficient throughput and reliability, low quality, limited services and incomplete coverage of Ukraine's territory. However, recent years have seen a significant leap in the development of telecommunication systems and computer networks in Ukraine. The growth of the number of active (regular) Internet users from 1% in 2001 up to 18% in 2008 strongly demonstrates this. Analysts claim that in reality over 10 million Ukrainians (21% population) presently use Internet services. And provided that the current economic crisis does not affect the present trend of lowering prices for advertising in the Internet and expanding its audience, then it is anticipated there will be up to 40% of the population using the Internet in three years time.

Good Practice Case #6: Law of Ukraine "*On main foundations of information society development in Ukraine on 2007-2015*" and Direction of Cabinet Council "*On approval of action plan on execution of tasks envisaged by Law of Ukraine "On main foundations of information society development in Ukraine on 2007-2015"*".

Accounting of Ukrainian Informational Resources (2007). This scheme provides for planned measures aimed at creating instruments and a system in order to account for the informational resources existing in Ukraine thanks to state funding. A vast action plan was laid out in the Government decree of 17 March 2004 No326 "*On the adoption of the Provisions on the National registry of electronic informational resources*"[19]. However, until now, the functionality of the system for accounting of informational resources has been hampered by the absence of an adequate statistics-gathering system. Because of this Ukraine has a low level of informational and analytical support for the operation of state institutions, whereas governmental institutions should be mostly interested in the application of the accumulated electronic informational resources. Uncertainty with the legal and financial bases for the activity of various IT-entities has led to an informational monopoly amongst administrative and commercial organizations for open general-use informational resources, to reduction of the State informational resources' value, and inability for most citizens to make to use of them.

It is important to note that information resources have been accumulated thanks to state and private investment. Because of the lack of state financing and traditional attempts to save on "minor" needs of citizens, culture has not been adequately covered. Although it has the most extensive informational resources available, its conversion into electronic form requires tremendous expense. The Ukrainian national and academic libraries have accumulated hundreds of thousands of literature samples and old prints. In the 1990s many developed countries began converting their national treasure into electronic libraries, which

[19] http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=326-2004-%EF&p=1238153345636349

have become not only an accessible source of knowledge for the humanity, but also a long-term source of profit. This illustrates the slogan: information is a product. It is hoped that the situation in Ukraine will improve since now it is possible to obtain convenient and low cost information storage media with capacities in the terabyte range. Consequently, libraries, film-foundations, museums, art galleries, and theatres - with precious national heritage content - have now realistic perspectives for creating electronic informational resources.

Over the past 5 years a series of departmental and inter-departmental informational and analytical systems have been created and introduced, as well as various corporate systems in production, financial, trading, media and other organizations. Most of these corporate systems now face the following two main tasks: (1) harmonization of data formats and protocols for supporting interoperable information exchange between businesses and state / local authorities; (2) utilization of algorithms to analyse the accumulated information resource in the corporate system in order to support management decisions. The situation generally corresponds with that in mid-1990s in developing countries. It was the time when EDI-systems (Electronic Data Interchange) emerged, and OLAP and Data Mining mechanisms started to be used for ultra-large databases and information warehouses.

A typical system of information and analytical support for local executive authorities has been deployed in order to support IT development. Implementing the NIP projects, the following components of the system have been developed and introduced: automated classifier for administrative territorial subdivision of Ukraine on the basis of mapping data, interfaces for data exchange between regional and city level subsystems, and electronic document exchange systems and data protection.

e-Government (2007). e-Government cannot function efficiently without electronic document exchange or digital signatures. Since 2006, there have been significant achievements in the development of infrastructure on the governmental level (in ministries and departments). Additionally, since 2003, typical software tools have been developed to support management functions for state administrations of different levels: region, city, oblast (these tools have been extensively introduced in tens of administrations).

Analysis of national electronic informational resources reveals that the largest part of electronic resources of state and local authorities is located on websites. In addition, the unified web-portal of the Cabinet of Ministers - as the central segment of the “Electronic Government” reference system being created - integrates 79 websites of executive bodies and 25 websites of oblast state administrations, Kyiv and Sevastopol city state administrations. Today, 2.5 million visitors a year use the information from the unified web-portal.

For the moment, the “e-Government” system only works as an informational service: no on-line communication with authorized state employees is possible. The situation with regard to servicing legal entities and physical persons using the “e-Government” system is presented in the Exhibit below (as of December 2008). For comparison, data from 30 September 2007 is presented in parentheses.

Exhibit 19: General-purpose services

	Internet office	Document samples	Job positions
Central Authorities, %	76 (72)	90 (90)	96 (96)
Region state administrations, %	93 (93)	88 (85)	96 (96)

It should be noted that access to information is not evenly spread. There is some "informational inequality" between different regions, branches of economy, and different social groups. The level of computer literacy among citizens is relatively low and new ways of informing inhabitants and interacting with authorities are being introduced quite slowly.

4 ICT Co-operation with the EU

4.1 Co-operation involving RTD community

The current education system in Ukraine is still strongly shaped by its Soviet heritage. The USSR distributed research centres and supported an almost uniform level of school education. However, first class higher education institutes were concentrated mainly in Moscow and Leningrad. Nevertheless, due to high state bursaries, free education and lodgings, students could travel to higher education institutions within the USSR. Entrance to universities was limited and competition based. Exemption from compulsory army service, early examinations (which permitted second attempts during the same year) and high prestige resulted in very strong competition amongst students to study at the top 3-5 Soviet technical universities. This is why a large portion of Ukrainian researchers graduated from Moscow and Leningrad universities. On other hand, this policy is responsible for the relative weakness of post-Soviet Ukrainian higher education. But, even with big lag behind Russia, Ukrainian math and science education is highly rated around the world (see Exhibit below).

Exhibit 20: Quality of math and science education [20]

Measure	Ukraine	Russia	Poland	Germany
Rank of country from 1 (the best) to 134 (the worst in the rating)	32	24	40	44
Score from 1 (lag far behind most other) to 7 (among the best)	4.94	5.05	4.75	4.59

To solve this problem the National Doctrine of Education Development was developed and approved by Ukraine President Decree No 347/2002 of April 17, 2002. The Doctrine stipulates the adoption of European standards for the national education system and wide uptake of ICT. And, as a consequence, strong co-operation between Ukrainian and European universities was started. Specifically, implementation of the doctrine has resulted in Ukraine joining the '*Bologna system*' in May 2005[21]. The Delegation of the European Commission, French Cultural Centre in Ukraine, International Renaissance Foundation, United Nations Development Programme and European Centre of Co-operation in Education participated in the project. However, most funding came from the Ukraine government.

Exhibit 21: Education expenditure as a percentage of GNI

Measure	Ukraine	Russia	Poland	Germany
Rank of country from 1 (the highest) to 134 (the lowest)	60	89	27	52
%	4.41	3.54	5.39	4.52

According to the 2009 Rating of Ukrainian universities "Compass"[22], 103 higher education institutions educate and train ICT specialists in Ukraine. This number includes higher education institutes of 3rd and 4th level of state accreditation, but not separate regional branches. Out of 103 institutions, only 28 universities were within 10% of the highest rated institution - National Technical University of Ukraine, Kyiv Polytechnic (NTUU KPI) - for at least one measure. The highly disproportionate educational quality observed in Ukraine is due to two factors. The first is a consequence of the aforementioned Soviet approach of concentrating educational resources in large cities at the expense of provincial ones. The second is a consequence of lower quality "commercial universities" that have recently materialised due to the increased demand of high school graduates to enrol at university (see Exhibit below) which, in turn, is due to high youth unemployment in the 1990s.

Exhibit 22: Gross tertiary education enrolment rate

Measure	Ukraine	Russia	Poland	Germany
Rank of country from 1 (the highest) to 134 (the lowest)	14	16	20	44
%	72.78	72.28	65.58	46.34

[20] The Global Information Technology Report 2008–2009, http://www.insead.edu/v1/gitr/wef/main/home.cfm
[21] http://www.bologna-bergen2005.no
[22] http://www.yourcompass.org/PDF%20Tables/Compass2009_ITRus.pdf (in Russian)

With the rapid increase in higher education enrolment, average quality has decreased. Efforts to restore the quality of university diplomas are the focus of the "Plan of Education Development till 2010" being implemented by the Ministry of Education and Science, on the basis of Ukraine's 2006 national report on implementation of the Bologna process.

Each of the 28 best universities reported in "Compass" participate in international projects with European partners. Most of these projects are devoted to training Ukrainian students and young researchers in Europe, student exchange programs and postdoctoral fellowship programmes. Such programmes are typically sponsored by European universities[23], foreign and Ukrainian funds. Numerous American organisations also organise "student programmes" with Ukraine: American Councils for International Education (ACCELS), Soros' International Renaissance Foundation, Fulbright programme and International Research and Exchanges Board (IREX). European organisations active in this field include ones from the UK (Royal Society, Joint Industrial and Commercial Attachment Programme, Enterprise Europe, the Ukraine Centre University of North London, Scottish University, and the Royal College of Surgeons of Edinburgh), Germany (Deutscher Akademischer Austausch Dienst), and France (State grants, Copernicus).

Joint study programmes (e.g. TEMPUS) are very popular among Ukrainian private universities. However, brain drain is usually the result of such cooperation. A 2003 poll of Russian students based at universities in OECD countries showed that 45% planned to find work abroad, 20% planned to continue studying abroad, and just 18% intended to return to Russia[24]. There is no reason to suppose the situation in Ukraine will be different. Young Ukrainian ICT specialists with a Western university diploma have good chances to find work in the EU or North America as illustrated in the Exhibit below.

Exhibit 23: Highly skilled expatriates in OECD countries by country of birth[25]

Measure	Ukraine	Russia	Poland	Germany
Total number of highly skilled expatriates	753,080	580,570	1,276,482	2,933,757
% of highly skilled expatriates among all expatriates	27.2	43.0	25.7	29.5

Very little research collaboration takes place between Ukrainian universities and European research organisations. According to their web sites, only 16 of the 28 top rated Ukrainian universities had been involved in any international ICT research projects during recent years. About a half of these projects were funded by or via the "Science & Technology Center in Ukraine" (STCU). Big international companies such as Intel, Motorola, Microsoft, IBM, Samsung and Panasonic funded about 25-30 percents of all the projects. However, industrial project budgets are usually bigger than research grants. As a typical example, the Exhibit below shows the ICT research contracts carried out by the Department of System Design of the Institute of Applied System Analysis in 2006.

Exhibit 24: ICT research at Dept of System Design, Institute of Applied System Analysis (2006)[26]

Funding Source	Sum in UAH	%	Sum in Euro
1. Ministry of Education and Science	81,970	18.4	12,500
2. Local commercial enterprise	62,400	14.0	9,500
2. STCU	76,800	17.2	11,700
3. Panasonic	225,000	50.4	34,300
Total	446,170	100.0	68,000

The most developed area of ICT collaboration between European and Ukrainian universities is ***e-Learning*** and other ICT techniques used in education.

[23] http://www.ed.net.ua/index_e.htm
[24] http://www.chelt.ru/2003/7-03/supian-7-03.html (in Russian)
[25] http://www.un.org/esa/population/migration/turin/Symposium_Turin_files/P09_Dumont&Lemaitre.pdf
[26] http://cad.ntu-kpi.Kyiv.ua/?cid=doslidzhennya (in Ukrainian)

Case-Study #1
Kyiv-Mohyla Academy's co-operation with EU partners in developing a computer multimedia resource centre[27]. The development has been supported since 1999 via a succession of three-year TEMPUS/TACIS grants. Two of them - JEP23055-2002 "Electronic Media Resource Centre in Ukraine" (€440,960) and IB_JEP25142-2004 "Training Courses for Kyiv-Mohyla Collegia Network" (€472,155) – were successfully implemented. During the second project, collaborative development of e-Learning tools was carried out with HTWK Leipzig and the finished products presented several times at the CeBIT fair in Hanover. The Academy also produces its own e-Learning tools and has implemented Ukrainian language courses for the European learning platforms Moodle and Ilias

Case-Study #2
Kharkiv Polytechnic Institute has collaborated with London Metropolitan University since 2001. Their collaboration is devoted to e-Learning of Ukrainian administrative officers. The first project (2001-2003) was funded by UK Ministry of International Development. The second one TEMPUS/TACIS IB JEP-25254-2004 (2005-2009) consisted in the development of training programmes on European integration for Ukrainian administrative officers of 5-7 category level. A very similar project for administrative officers of 2-4 category level (2005-2009) was funded by UK Foreign Office together with the UK Embassy in Kyiv. It is difficult to describe such projects as examples of research collaboration. Rather they are examples of educational sponsorship with often strong political overtones

Ukrainian public research institutions are mainly managed by the ***National Academy of Sciences of Ukraine*** (NASU). NASU is a typical Soviet style research cluster with an immobile structure. Nevertheless, NASU's size is impressive: 173 institutes and 43 scientific & production enterprises, 43,211 employees, 19,818 researchers, 8,171 candidates of science (~PhD level), and 2599 doctors of science. However, NASU's annual budget of about €260 million is relatively small[28]. By way of comparison, the Max Planck Society in Germany has 76 institutes, 11,000 researchers and an annual budget of €1.7 billion. Further points of concern with NASU include the fact it has an average candidate's age of 51 and an average doctor's age of 62.

NASU is independent but supported by the state. In theory this means that government assign funds to the Academy, but does not influence their expenditure. In fact government distributes its minimal funding mostly for salaries and utilities. Goal-oriented government programmes, research grants and business contracts are the main sources of NASU's institutional funding. Some branch ministries have their own research institutes. Under conditions of permanent budget limitations, many institutes are converted step-by-step into industrial enterprises or administrative offices. Despite this tendency persisting since the 1990s, there are some applied-research institutes that continue to produce high level scientific research. The Exhibit below illustrates how Ukraine ranks when compared to several other countries for the availability of qualified ICT scientists and engineers.

Exhibit 25: Availability of scientists and engineers[10]

Measure	Ukraine	Russia	Poland	Germany
Rank of country from 1 (the best) to 134 (the worst in the rating)	54	34	69	26
Score from 1 (lag far behind most other) to 7 (among the best)	4.43	4.76	4.13	4.92

Expert assessments of the quality of scientific research institutions are usually favourable towards Ukrainian science, and so indirectly towards NASU (see Exhibit below). However, some Ukrainian researchers of the "new generation" insist that the Academy is inefficient and should be reformed[29].

Exhibit 26: Quality of scientific research institutions[10]

Measure	Ukraine	Russia	Poland	Germany
Rank of country from 1 (the best) to 134 (the worst in the rating)	48	45	56	6
Score from 1 (nonexistent) to 7 (the best in their fields)	4.24	4.28	4.07	5.75

[27] www.emerecu.ukma.Kyiv.ua
[28] http://www.nas.gov.ua/aboutNASU/Pages/default.aspx (in Ukrainian)
[29] http://www.expert.ua/articles/12/0/6120/ (in Russian)

NASU aims a lot of effort at the advancement of international scientific ties and further integration with the world academic community. Altogether, the Academy's institutions are currently engaged in about 100 joint research projects under both direct agreements with foreign research institutions and those financed by grants provided by international science foundations and programmes.

Agreements have been concluded and intellectual contacts established with research centres from more than 50 countries in Europe, Asia and the Americas. Among them are academies of sciences of various countries, well-known research organizations, such as German Research Society (DFG), National Centre for Scientific Research in France (CNRS), National Research Bureau in Italy (CNR), National Research Council of Turkey (TUBITAK), and numerous foreign universities. In particular, NASU has advanced multilateral collaboration with academies of sciences from the Black-Sea countries.

15 years ago, on NASU's initiative, the International Association of the Academies of Sciences was set up, which now integrates national academies of sciences, leading science centres, universities and academic foundations of many countries. NASU is engaged in the activities of over 20 prestigious international research organizations: International Institute for Applied Systems Analysis (IIASA, Austria), Joint Institute for Nuclear Research (Russia), European Center for Nuclear Research (CERN), it interacts extensively with UNESCO, IAEA, WHO. The Academy and its institutions represent Ukraine in the International Council for Science (ICSU) as well as over 30 professional science unions and associations.

Foreign economic ties with NASU institutions are on the increase. For example, R&D works have been conducted under agreements with foreign companies such as Intel, Motorola, Microsoft, Boeing, GE, PPG Industries, Inc., Folgat AG, Sodern, Sigma Aldrich, Global Metal Technology and Norinko. Also, the first ever FP7 ICT Future Emerging Technology (FET) project involving a Ukrainian partner is with the Institute of Low Temperature Physics and Engineering of NASU (Spin-Thermo-Electronics, STELE). The project began at the start of 2009 and runs for three years.

Arguably the strongest NASU institute involved in ICT research is ***Glushkov Institute of Cybernetics***. The institute has a significant size – 26 laboratories and 700 employees including 400 researchers and engineers, 160 candidates and 59 doctors of science - and is involved in a steadily increasing number of international ICT research projects (see Exhibit below). However, there is a strong prevalence of STCU funding over direct European grants (e.g. FP7).

Exhibit 27: Structure of Glushkov Institute of Cybernetics' international projects

		2006	2007	2008
Grants:	STCU	6	7	6
	INTAS	1	2	1
	CRDF	2	1	1
	NATO	1	1	1
Partners:	EU	8	8	7
	USA & Canada	8	7	13
	Former USSR	11	7	9
Total projects:		**14**	**14**	**17**

Current EU approaches to research cooperation with Ukraine ignore the specificity of start conditions for Ukrainian participants. This makes establishing collaboration tricky and inefficient in terms of efforts to revenue ratio for Ukrainians.

The ***main barriers*** to ICT cooperation between European and Ukrainian research groups are highlighted in the table overleaf together with an evaluation of the policy measures – from the Government of Ukraine and/or European Commission – designed to address them.

Exhibit 28: Main barriers to ICT co-operation and policy responses

Description of barrier	Measures addressing the barrier (if any)	Relevance of policy response	Evidence of impact
1. Lack of awareness in Europe of Ukrainian ICT research groups.	a) Unaware of any government measures. b) Three European Commission funded FP7 ICT Support Actions, that collectively develop an online database of Ukrainian ICT research groups and organise FP7 ICT awareness/training events, helpdesks and EU promotion tours: - SCUBE-ICT (www.scube-ict.eu), - ISTOK-SOYUZ (www.istok-soyuz.eu) and - EXTEND (www.extend-ict.eu) –	a) 1 b) 4	a) - b) Too early to say
2. Lack of awareness amongst Ukrainian ICT research groups of the FP7 ICT programme and lack of understanding and skills on how to effectively participate.	a) Unaware of any government measures. b) Three European Commission funded FP7 ICT Support Actions: SCUBE-ICT (www.scube-ict.eu), ISTOK-SOYUZ (www.istok-soyuz.eu) and EXTEND (www.extend-ict.eu)	a) 1 b) 4	a) - b) Too early to say
3. Lack of ICT related technology-transfer between universities/public research organisations and (European) private industry.	Technology transfer regulation - Law on State Regulation of Activity in the Sphere of Technology Transfer N 143-V, 2006	3	2
4. Lack of a national ICT research strategy.	Law on Scientific and S&T Expertise, 1995 Law on Priority Directions of Innovation Activity in Ukraine N 433-IV, 2003 State Programme of Forecasting of S&T and Innovation Development for 2004-2006	3	2
5. Lack of government ICT policy monitoring system based on standardised, internationally recognised ICT indicators/statistics. Lack of experience of ICT policy development, monitoring, evaluation and impact assessment based on standardised ICT indicators.	Direction of Cabinet Council "On approval of action plan on execution of tasks envisaged by Law of Ukraine "On main foundations of information society development in Ukraine on 2007-2015" No 653-R from 15.08.2007 It is foreseen to develop a system of Indicators for monitoring and forecasting the development of an Information Society.	4	No details concerning progress yet available

Policy response ranking scored from 1 to 5: 1. No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development); 2. Policy development under way to respond to challenge (policy debate or design launched); 3. Specific measures existing for some time but insufficient to respond fully to challenge; 4. Existing measure plus one or more newly launched measures (during last 18 months); 5. A comprehensive set of measures which potentially responds fully to the challenge.

Evidence of impact scored from 1 to 5: 1. Trend for indicators has worsened since measure(s) introduced, 2. No observable change in trend since measure(s) introduced, 3. Too early to appraise (measures introduced in last 24 months), 4. Trend for indicators has improved since measure(s) introduced, 5. Evaluation or study indicates measure(s) has clearly contributed to improving performance of country.

4.2 Co-operation involving private industry

Ukraine is increasingly emerging as a low cost hub for high quality software development. This is reflected in the relative amount of ICT services exported (% of total services exported), which has increased over 40% from 2.5 to 3.6 between 2000 and 2007[30]. Exported ICT services include IT consulting, integration, software re-engineering, software testing and outsourcing. This highlights the significance of highly skilled labour in Ukrainian IT export. About 1900 companies work in this market segment. Sales orders to Ukrainian software companies come mainly from the USA, Canada, Germany, France, Israel, and Russia.

According to goaleurope.com, a leading expert on Russian & Eastern European software development, the offshore outsourcing market in Ukraine reached $246 million in 2006[31]. It grew 47% in 2006 with 30,000 IT graduates arriving into the workforce each year. A lack of the integration with the EU keeps prices in check and IT professionals from leaving the country. It is not unheard of for Poland and other new EU member states to seek qualified IT resources in Ukraine. And Germany recognizes the outsourcing opportunity in Ukraine: German customers (60 in total) 'employ' 6% of all offshore outsourcing resources in Ukraine. However, according to the State Committee on Statistics, the official total figure for software export was only $4.7m in 2007, showing that a portion of IT outsourcing activities is still undeclared.

The IT outsourcing industry is well established in Kyiv, where more than 50% of all software development professionals are employed, but is simultaneously rapidly expanding into Lviv and Kharkiv. The size of the companies involved varies significantly: of 70 Ukrainian companies interviewed, only seven of them employed more than 300 people in 2006 whilst 21 companies had 100 employees or more[32]. The largest Ukrainian IT outsourcing companies include Aricent, Infopulse, Lohika, Luxoft, Miratech, Softline, Softserve and Validio[33]. Nowadays, these companies also start to face competition from multinational enterprises. Many of the world's most famous IT companies - Microsoft, Sun, IBM, Dell and Cisco – have also established representative offices in Kyiv in order to tap into the expanding national market.

Several medium sized European IT companies have recognized the opportunities in Ukraine and developed strategic links, commercial agreements or acquired shareholdings in Ukrainian IT outsourcing companies. For example:

- The Danish company Ciklum has 700 software developers – many of them are based in Ukraine - working for 86 customers in western Europe and elsewhere in the world. Ciklum offers teams of software developers to clients to manage directly and claims cost savings of 40-70% can be achieved on software development projects.
- Cross Border Projects based in Potsdam, Germany, is a provider of Ukrainian IT outsourcing services, but with a particular focus on German-speaking countries
- EDB Business Partner, a leading Nordic IT group, has become the major shareholder, client and business partner of the Ukrainian IT outsourcing company Miratech. Since 2008, 60.1 % of Miratech shares are owned by EDB Business Partner and the remaining 39.9 % by Miratech top management.

Overall, though, Ukraine does not compare particularly well to other countries as an IT outsourcing location. It only occupied 47th place on the list of AT Kearney's "Top 50 IT outsourcing locations" (2007)[34]. It has been observed that the Ukrainian government should support the IT industry by paying more attention to the area of IT governance and accounting standards, in order to establish more transparent financial and reporting systems, as well as legal forms for ensuring strong intellectual property protection[35]. Also, it has been noted that the Ukrainian government needs to put more effort into developing European and international awareness of its IT industry and companies as credible outsourcing suppliers[36],[37]. The Ukrainian government should study the way government agencies in countries such as Romania have successfully "branded" their fragmented IT outsourcing sectors, in order to develop an export promotion strategy for the national IT outsourcing sector.

[30] World Bank's "ICT at a Glance" 2009, http://devdata.worldbank.org/ict/ukr_ict.pdf
[31] http://www.itukraine.org.ua/object.php?id_object=179
[32] http://www.itukraine.org.ua/object.php?id_object=179
[33] Central and Eastern European Outsourcing Review 2007, http://hi-tech.org.ua/files/f121334609775.pdf
[34] www.atkearney.com
[35] E. Lenkiewicz, Support to the Development of Business Capacity of Ukrainian SMEs – International Dimension - Software and IT Services in the European Union - Market Survey, EuropeAid/124928/C/SER/UA, 2009
[36] E. Lenkiewicz, Support to the Development of Business Capacity of Ukrainian SMEs – International Dimension - Software and IT Services in the European Union - Market Survey, EuropeAid/124928/C/SER/UA, 2009
[37] IT Ukraine Association, www.itukraine.org.ua

In order to lobby the government and promote the IT industry, many private ICT organisations are members of active and influential IT associations – such as ***IT Ukraine Association***, ***Association of Information Technology Enterprises of Ukraine*** and ***Ukrainian Internet Association***. For example:

- The IT Ukraine Association organises annually a stand and the participation of a Ukrainian IT industry delegation at CeBIT, Hannover. During the 2008 event, a Ukrainian/German IT Forum was held that attracted 65 businessmen from Germany and Ukraine; while

- The Association of Information Technology Enterprises of Ukraine was one of the organisers of the international conference "*Strengthening the Public-Private Partnership in the Ukrainian ICT Sector*" held in Kyiv in late 2008[38]. Participants shared experience on strengthening cooperation between IT business in eastern and central Europe as well as discussing the following issues: legal limits for electronic communications, zero tax on wage for software developers, software market activation, and reduction of VAT on the software imports.

In many transition countries, the establishment of technoparks can help create a stimulating business environment conducive to cooperation between domestic and foreign private firms. Unfortunately, Ukraine has a rather poor track record in this area. Initially, in the mid 1990s, technoparks in Ukraine were considered as free economic zones (according to the "*Law on Basic Foundations of Creation and Functioning of Special Economic Zones*", 1992). Now eleven such zones exist in Ukraine. However, all of them have a non-technological orientation. Enterprises in these zones are largely involved in the resource based production of goods and services. In many cases these zones were created to reduce socio-economic problems of former coal-mining or ferrous metallurgy areas. The first technopark was created in 1994 in Brody, Western Ukraine, near the Polish border in the territory of a former missile base, but unfortunately, the attempt was not successful.

In July 1999, another "*Law on Special Regime of Investment and Innovation Activities for Technological Parks*" was passed through Parliament. According to this Law, three new technoparks with some real financial privileges for innovation companies were created – ***Technopark in the Paton Institute for Welding*** (Kyiv), ***Technopark in the Institute of Semiconductors*** (Kyiv), and ***Technopark in the Institute of Momo-crystals*** (Kharkiv). The key features of these technoparks are as follows:

1) All were created on the basis of leading institutes of the National Academy of Sciences of Ukraine with strong technological orientations;
2) Tax and customs privileges could not be received by the institutes themselves but only by the specially registered innovation projects performed in them.

Tax incentives included (a) the possibility to import all materials and equipment needed for the innovation project without paying custom duties; (b) the possibility to obtain tax credits; and (c) reduced taxes and access to cheaper credit (with state guarantees) was introduced (bearing in mind the high bank interest rates in Ukraine, the last step was especially important)

Later thirteen more technoparks were created in Ukraine - most of them between 2003 and 2004 - including the 'semiconductor technologies and materials' technopark, 'intellectual information technologies' technopark, and 'scientific and learning equipment' techopark.

At the beginning of 2005, almost all the privileges afforded to technoparks were abolished. As a result, only 8 technoparks out of 16 are conducting business activities. Of the eight that are not, some simply had no time and reason to commence operations following the ban on their special treatment. Others had not even been completely established prior to the cessation of privileges. Additionally, it is important to stress that only two technoparks can be considered as successful examples – Paton Welding Institute and Mono-Crystal Institute. They represented 98% of all innovation products being produced in technoparks between 2000 and 2006[39].

Under the FP6 IST programme, there were only 11 funded projects involving Ukrainian partners. All the projects were specific support actions, coordination actions or networks of excellence i.e no "research projects" such as STREPs or Integrated Projects. Only one of the projects – FP6 TOSSAD ("Towards open

[38] News release 25/11/08, IT Ukraine Association, http://www.itukraine.org.ua/object.php?id_object=247
[39] I. Yegorov et al, INNO-Policy TrendChart - Policy Trends and Appraisal Report – Ukraine 2007, FP6 BRUIT Project

source software adoption and dissemination") - involved a notionally 'private' company, the Ukrainian Lviv Institute for Business Informatics Ltd.

Despite the relatively low cooperation between Ukrainian and European private ICT organizations, there is a number of ***good case-studies***, which illustrate the *potential* for collaboration:

Case-Study #1
In May 2009, ***ELEKS Software***, a Ukrainian IT services and products company, together with its Jersey based business partner, teleologica ltd, completed the supply of a Customs system (CAESAR II) to the Jersey government. Earlier, in July 2005, Jersey's government had approved a package of major tax reforms that included the introduction of Goods and Services Tax - a VAT style consumption tax - in 2008. A fundamental requirement of the Jersey tax reforms was that technology should be deployed to minimize the administrative burden for both business and government. CAESAR II was commissioned to fulfill that requirement. The new system allows Jersey Customs to efficiently process more than 10,000 consignments per week compared to 200-300 per week previously. CAESAR II replaces and extends the functionality of the previous system used by Jersey Customs which had also been supplied by ELEKS and teleologica.

Case-Study #2
The ***Ukrainian Centre of Environmental and Water Projects (UCEWP) Ltd*** is a Ukrainian company specialising in R&D, consulting and software development, particularly with respect to modeling tools used in environmental management and emergency response. UCEWP staff has unique experience after working to prevent the spread of radiation following the Chornobyl accident in 1986. They have developed a set of 1-, 2- and 3-D models that are used for the simulation of hydrodynamics, radionuclide and other pollutant transport in rivers, reservoirs, lakes, estuaries, coastal areas and groundwater. Amongst the environmental hydro-thermal-dynamics work carried out by UCEWP have been several projects for the Dutch Nuclear Research and Consultancy Group (NRG): i) Cooling Ponds: 1-D Evaluation of their Environmental Impact; ii) Cooling Water Discharges by the Bergum Power Plant: Validation of Thermic 3-D Models on the Bergumermeer; and iii) Cooling Water in Rotterdam Harbour: A 3-D Evaluation of the Environmental Impact.

Case-Study #3
Ukrainian IT outsourcing company ***Miratech*** implemented an e-commerce solution for Crossoffice, a Swiss reseller of high-tech component items and office solutions. Crossoffice was looking for an e-commerce solution to start offering its products and services on the Internet. Having many different vendors, Crossoffice needed a bespoke system that would enable product details to be collected from different sources with distinct approaches for data storage and formatting. Based on a long-term successful relationship Crossoffice selected Miratech to develop the customised e-commerce solution called WebShop. The solution enabled Crossoffice to greatly increase its revenue and reduced company costs by 1.5 times.

Case-Study #4
Kyiv-base research and production firm ***GRIS LLC*** develops sophisticated GPS and geographic information systems (GIS) for land registration. Additionally, the company develops software and automation solutions in the fields of communications, document management and accounting for large enterprises and production sub-units. GRIS cooperates closely with ESRI, one of the world's leading developers of GIS technology. GRIS' recent international projects include a joint Ukrainian-Romanian GIS to monitor fisheries forage resources and environmental conditions as part of the effective management of the northwest region of the Black Sea and Danube River delta.

The ***main barriers*** to ICT cooperation between European and Ukrainian private firms are highlighted in the table overleaf together with an evaluation of the policy measures – from the Government of Ukraine and/or European Commission – designed to address them.

Exhibit 29: Main barriers to ICT co-operation and policy responses

Description of barrier or opportunity	Measures addressing the barrier	Relevance of policy response	Evidence of impact
1. Lack of awareness in Europe of Ukraine as an IT outsourcing centre. Highly fragmented IT outsourcing market which lacks national "branding" and export promotion support from the Ukrainian authorities.	a) Unaware of any government measures. b) EuropeAid Project "Support to the Development of Business Capacity of Ukrainian SMEs – International Dimension" (EuropeAid/124928/C/SER/UA). The project includes work to improve State policy in the sphere of SME support development as well as export promotion support for Ukrainian IT SMEs (Duration: Sept 2007 – August 2009).	a) 1 b) 4	a) - b) Too early to say
2. Lack of an efficiently operating ICT technopark / business incubator (e.g. technopark in the Institute of Semiconductors, Kyiv)	Law on Basic Foundations of Creation and Functioning of Special Economic Zones, 1992 Law on Special Regime of Investment and Innovation Activities for Technological Parks, 1999-2006 Law of Ukraine on the Special Economic Zone 'Yavoriv', 1999-2006 Law on the Scientific Park 'Kyivska Politechnika', 2006	3	2
3. Lack of awareness amongst Ukrainian ICT companies of the FP7 ICT programme and lack of understanding and skills on how to effectively participate	a) Unaware of any government measures b) Three European Commission funded FP7 ICT Support Actions that collectively organise FP7 ICT awareness/training events, helpdesks and EU promotion tours : - SCUBE-ICT (www.scube-ict.eu), - ISTOK-SOYUZ (www.istok-soyuz.eu) and - EXTEND (www.extend-ict.eu) –.	a) 1 b) 4	a) - b) Too early to say
4. Lack of government ICT policy monitoring system based on standardised, internationally recognised ICT indicators/statistics. Lack of experience of ICT policy development, monitoring, evaluation and impact assessment based on standardised ICT indicators.	Direction of Cabinet Council "On approval of action plan on execution of tasks envisaged by Law of Ukraine "On main foundations of information society development in Ukraine on 2007-2015" No 653-R from 15.08.2007 It is foreseen to develop a system of Indicators for monitoring and forecasting the development of an Information Society.	4	No details concerning progress yet available

Policy response ranking scored from 1 to 5: 1. No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development); 2. Policy development under way to respond to challenge (policy debate or design launched); 3. Specific measures existing for some time but insufficient to respond fully to challenge; 4. Existing measure plus one or more newly launched measures (during last 18 months); 5. A comprehensive set of measures which potentially responds fully to the challenge.

Evidence of impact scored from 1 to 5: 1. Trend for indicators has worsened since measure(s) introduced, 2. No observable change in trend since measure(s) introduced, 3. Too early to appraise (measures introduced in last 24 months), 4. Trend for indicators has improved since measure(s) introduced, 5. Evaluation or study indicates measure(s) has clearly contributed to improving performance of country.

4.3 ICT policies and programmes facilitating co-operation with the EU

Ukraine is pursuing a policy of European integration and aspires to become a member of the European Union. The establishment of a knowledge-driven economy will be essential for this purpose. Certain conditions already exist in Ukraine that make this goal feasible, including the field of ICT, where the country has an extensive network of ICT research institutions as well as industrial enterprises and scientific societies and associations.

Formal cooperation between the EC and Ukraine in ICT can be traced back to at least 1998 when the ***Partnership and Co-operation Agreement (PAC)*** came into force[40]. The Agreement provided a framework for political relations. Co-operation in the field of ICT was addressed either directly or indirectly in several articles. In October 2009, a new cooperation agreement entitled "***EU-Ukraine Association Agenda***" was enacted[41]. The agreement has the two specific sections pertaining to EU-Ukraine ICT cooperation – Information Society and Science and Technology.

In July 2002, an "***Agreement on Co-operation in Science and Technology***" between the European Community and Ukraine was signed. It established a base for further enlargement and enhancement of collaboration between scientists. This agreement stipulates that cooperation can be implemented in research areas including fundamental studies, technology development and demonstration activities. Furthermore, the European Research and FP6 Conference (Brussels, November 2002) opened a new possibility for Ukrainian scientists within European research. ***FP6, and now FP7, are open to the participation of Ukrainian organisations and offer Ukrainian researchers the opportunity to integrate into the European Research Area (ERA).***

In August 2003, the ***National Information Centre for Ukraine*** – EU S&T Cooperation (NIP Ukraine) was established to promote the FP6 programme to the Ukrainian S&T sector and facilitate the participation of Ukrainian researchers in EU scientific activities, including ICT. It is a state agency that reports to the Ministry of Education and Science of Ukraine.

Since 2005, EU-Ukraine cooperation activities have been largely defined by ***the bilateral EU-Ukraine European Neighbourhood Policy (ENP) Action Plan***[42], which is based on the PAC. The Action Plan sets out an agenda of political and economic reforms with short and medium-term priorities. It has two articles – 58 and 59 - specifically addressing "*Information Society*" cooperation, namely:

Article 58: Accelerate progress in electronic communications policy and regulation

- *Adopt and start implementing the national concept for the development of electronic communications*
- *Adopt regulations concerning licensing, interconnection, numbering and generally accessible telecommunications services in accordance with the Law of Ukraine on Telecommunications*
- *Establish the National Communications Regulatory Commission in accordance with the Law of Ukraine on telecommunications*
- *Ensure fair competition in the electronic communications markets"*

Article 59: Accelerate progress in the development of Information Society services and in the integration of Ukraine into the IST research programme

- *Adopt the State Programme "e-Ukraine" for the development of the Information Society and explore possible support by the EU for its implementation.*
- *Promote the widespread use of the new technologies by business and administration, in particular in the health and the education sectors (e-commerce, e-government, e-health, e-learning), via the provision of advanced infrastructures, the development of local content and the introduction of pilot projects, e.g. for the mutual recognition of electronic signatures.*
- *Improve the use of Internet and online services by the citizens via computer training programmes for the general public.*
- *Adopt a specific plan to promote the participation of Ukraine in the IST part of the 6th Framework Programme."*

[40] Partnership and Cooperation Agreement between the European Communities and their Member States, and Ukraine, http://trade.ec.europa.eu/doclib/docs/2003/october/tradoc_111612.pdf
[41] EU-Ukraine Association Agenda, http://eeas.europa.eu/ukraine/docs/2010_eu_ukraine_association_agenda_en.pdf
[42] EU/Ukraine European Neighbourhood Action Plan, DG External Relations, http://ec.europa.eu/world/enp/pdf/action_plans/ukraine_enp_ap_final_en.pdf

Under the ENP Action Plan, the EU funds technical assistance activities to support legislative approximation, regulatory convergence and institution-building via several mechanisms: i) technical assistance and information exchange (TAIEX); ii) long-term twinning arrangements with EU Member States' administrations (national, regional or local); and iii) participation in relevant Community programmes and agencies. Use of the TAIEX and twinning mechanisms has started in 2008 but, so far, there have been no activities funded relating to ICT cooperation.

On the other hand, besides the FP7 SCUBE-ICT project (www.scube-ict.eu), DG Information Society of the European Commission is also currently funding two other FP7 Support Actions - ISTOK-SOYUZ (www.istok-soyuz.eu) and EXTEND (www.extend-ict.eu) – which are assisting Ukrainian ICT organisations to participate in the FP7 ICT programme.

Under the umbrella of European Neighbourhood Policy, the EU also funds the ***cross-border cooperation (CBC) scheme***. Ukraine participates in three programmes: Poland-Belarus-Ukraine, Hungary-Slovakia-Romania-Ukraine and Romania-Moldova-Ukraine. Although not an explicit scheme to support ICT cooperation, the priorities of the programmes allow such activities to be funded e.g. priority 1 - increasing competitiveness of the border area of the Poland/Belarus/Ukraine CBC.

The ***Tempus programme*** is another EU scheme that has provided since 1990 a potential route towards ICT cooperation[43]. Tempus supports the modernisation of higher education and creates an area of co-operation in countries surrounding the EU, including Ukraine. Good examples of ICT cooperation via this mechanism include Kherson State University's involvement in two projects with European universities: "Computing Curricula for Ukrainian Universities (JEP-27237-2006)" and "ICT based learning and personal development services for students (JEP-27247-2006)". Meanwhile, the EU's ***FP7 Marie Curie Actions*** help to fund all kinds of training and mobility opportunities for researchers – including computer science and technology - throughout their careers.

In recent years, there has been a number of ***EU funded ICT related supply and service contracts concerning Ukraine***, such as: i) monitoring of Russian and Ukrainian telecommunications and the information society in 2006 (Contract reference: 30-CE-0009814/00-41); ii) harmonisation of competition and public procurement systems in Ukraine with EU standards in 2007 (Contract reference: 2008/S 33-044405); iii) supply of IT equipment and services for a management information system for vocational education and training in Ukraine (Contract reference: 2007/S 24-027788); and iv) supply of IT equipment and software for a rapid alert system on dangerous goods for the centre for processing queries from WTO member countries in 2008 (Contract reference: 2008/S 66-088158).

Finally, it is worth mentioning the ***Science and Technology Center in Ukraine (STCU)***[44], an intergovernmental organization dedicated to the prevention of the proliferation of expertise related to weapons of mass destruction. Since 1993, private companies and government agencies from the European Union, United States, and Canada have used the STCU to manage over 1350 R&D projects, worth over $188 million, including many in the field of ICT. Through the STCU Partner Program, private companies, academic and non-government organizations, and government agencies may contract research and development work to Ukrainian as well as Azeri, Georgian, Moldovan and Uzbek scientists and institutes.

In summary, the key existing measures supporting ICT cooperation between the EU and Ukraine are listed below.

Exhibit 30: ICT Policy Measures facilitating co-operation with the EU

N°	Title	Organisation responsible
1	FP7 ICT Programme	DG Information Society, European Commission
2	Tempus	DG Education and Culture, European Commission
3	FP7 Marie Curie Actions	DG Research, European Commission
4	European Neighbourhood and Partnership Instrument (ENPI) – Twinning Mechanism	Delegation of the European Commission to Ukraine
5	STCU Partner Program	Science and Technology Center in Ukraine (STCU)
6	European Neighbourhood and Partnership Instrument (ENPI) Cross Border Cooperation (CBC) scheme: ▪ Poland-Belarus-Ukraine CBC ▪ Hungary-Slovakia-Romania-Ukraine ▪ Romania, Moldova, Ukraine	DG External Relations, European Commission

[43] Tempus Scheme, http://ec.europa.eu/education/external-relation-programmes/doc70_en.htm
[44] STCU, http://www.stcu.int

5 Recommendations to support future EU-Ukraine ICT Co-operation

Based on an analysis of the gaps in policy response to EU-Ukraine research cooperation barriers for universities and public research organisations (Exhibit 28) and private industry (Exhibit 29), the following concrete steps and instruments are recommended to improve cooperation within the ICT R&D sector. The suggestions target different ICT actors (i.e. RTD community, private industry and government) in each region (namely in Ukraine and in EU) and are separated between strategic (medium-to-long term) and operational levels (short-to-medium term and/or making use of existing policy measures).

5.1 Recommendations for Ukrainian ICT R&D actors

Exhibit 31: Recommendations for Ukrainian ICT RTD community

RTD Community
Strategic Level
Recommendation #1 Recommend to DG Information Society and Media (DG INFSO) to fund future dedicated SICA projects as well as support actions aiming to support cooperation between the EU's and Ukraine's ICT RTD Communities in FP7 ICT throughout the FP7 programme (up to 2013), as well as prepare the ground for FP8-ICT (beyond 2013). Responsible Organisation(s): ICT RTD Community actors (e.g. Lviv Centre of S&T and Economic Information (LvCSTEI), Glushkov Institute of Cybernetics (GIC), Institute of Artificial Intelligence Problems (IAIP) and Technology Business Incubator "Kharkov Technologies" (TBI)). Timing: 2011-2015 *ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3*
Recommendation #2 Elaborate a concise draft and recommend to the Ministry of Infrastructure and Ministry of Education, Science, Youth and Sports to launch a competitive "ICT technology transfer" programme where consortia comprising of High Educational Institutes (HEI), public research organisations and industrial partners implement technology-transfer projects (from academic/public research organisations to industry). The programme should be largely "bottom-up" driven, where government defines broad ICT themes but consortia formulate their own specific proposal ideas and compete against each other. The programme should allow the participation of EU RTD actors well as private companies at their own costs. Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI) Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 28): 3*
Recommendation #3 Ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU know-how on how to run an ICT based business incubator. Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI) Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 28): 3*

Recommendation #4

Ask for support to ICT technology transfer from the Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA). This project aims to support the development of technoparks and innovative clusters to support innovation and technology transfer.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

Operational Level

Recommendation #1

Organise annual SICA (Special International Cooperation Action) EU-Ukraine scientific workshops in Ukraine focussed on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshops will be to pinpoint ICT research topics which could form the basis of EU-Ukraine SICA calls in future FP ICT work programmes. Present and recommend findings State Agency on Science, Innovations and Information, Ministry of Education, Science, Youth and Sports, Academy of Science of Ukraine and DG Information Society and Media (DG INFSO).

Responsible Organisation(s): ICT RTD Community actors (e.g. Lviv Centre of S&T and Economic Information (LvCSTEI), Glushkov Institute of Cybernetics (GIC), Institute of Artificial Intelligence Problems (IAIP) and Technology Business Incubator "Kharkov Technologies" (TBI)).

Timing: 2011-2012.

ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 2

Recommendation #2

Ask the Project Administration Office for the EU technical assistance project "*Joint Support Office for Enhancing Ukraine's Integration in the European Research Area*" (EuropeAid/127891/C/SER/UA) to support the strengthening of national (and possibly regional) FP7 ICT national contact point (NCP). This project will include capacity building for a local Joint Support Office to increase participation in FP7.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 2

Recommendation #3

Recommend to the State Agency on Science, Innovations and Information to organise and/or financially support regular/annual FP7 ICT awareness raising/training workshops involving European ICT experts from RTD Community and Private Industry.

Responsible Organisation(s): ICT RTD Community actors (e.g. Lviv Centre of S&T and Economic Information (LvCSTEI), Glushkov Institute of Cybernetics (GIC), Institute of Artificial Intelligence Problems (IAIP) and Technology Business Incubator "Kharkov Technologies" (TBI))

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 2

Recommendation #4

Increase the mobility of Ukrainian researchers. Set-up agreements with EU leading RTD organisations for joint RTD experiments, internships, etc.

Responsible Organisation(s): ICT RTD Community actors (e.g. LvCSTEI, GIC, IAIP and TBI)

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 28): 3

Exhibit 32: Recommendations for Ukrainian ICT Private Industry

Private Industry
Strategic Level
Recommendation #1 Ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU branding know-how and export promotion experience for the national IT outsourcing sector (e.g. between Ukraine's Ministry of Infrastructure and Romania's Ministry of Communication and Information Society, which helped implement RomaniaIT, www.romaniait.com). Responsible Organisation(s): Organisations representing Ukrainian ICT Private Industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI) Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 29): 1*
Recommendation #2 Recommend to DG INFSO to fund future dedicated EECA SICA research projects as well as support actions aiming to support cooperation between the EU's and Ukraine's ICT Private Companies in FP7 ICT throughout the FP7 programme (up to 2013), as well as prepare the ground for FP8-ICT (beyond 2013). Responsible Organisation(s): Organisations representing Ukrainian ICT Private Industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI) Timing: 2011-2015 *ICT Cooperation Barrier Addressed (Exhibit 29): 3*
Operational Level
Recommendation #1 Encourage Ukrainian ICT Private Industry to make greater use of the STCU's (Science and Technology Centre in Ukraine) technology transfer and research partnerships programmes. These are programmes that enable STCU partners (e.g. various EU member states) to utilise the R&D and technology know-how of science and technology organisations from Ukraine. For example, the STCU should ask Ukrainian ICT organisations to submit new technologies and R&D competencies that they wish to have promoted via the STCU website (www.stcu.int). Responsible Organisation(s): Organisations representing the Ukrainian ICT private industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI) Timing: 2011-2012 *ICT Cooperation Barrier Addressed (Exhibit 29): 2*
Recommendation #2: Ask for support to ICT technology transfer from the Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA). This project aims to support the development of technoparks and innovative clusters to support innovation and technology transfer. Responsible Organisation(s): Ukrainian Business Incubators and Innovation Centres Association (UBICA). Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 29): 2*

Recommendation #3
Recommend to the State Agency on Science, Innovations and Information to organise and/or financially support regular/annual FP ICT awareness raising/training workshops involving European ICT experts from RTD Community and Private Industry.

Responsible Organisation(s): Organisations representing Ukrainian ICT Private Industry (e.g. Association of Information Technology Enterprises of Ukraine (APITU), Ukrainian Hi-Tech Initiative and TBI)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 29): 3

Exhibit 33: Recommendations for Ukrainian Government

Government
Strategic Level
Recommendation #1 Recommend to DG Information Society and Media (DG INFSO) to fund future dedicated SICA projects as well as support actions aiming to support cooperation between the EU's and Ukraine's ICT RTD Communities in FP7 ICT throughout the FP7 programme (up to 2013), as well as prepare the ground for FP8-ICT (beyond 2013). Responsible Organisation(s): State Agency on Science, Innovations and Information and Ministry of Education, Science, Youth and Sports. Timing: 2011-2015 *ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3*
Recommendation #2 The State Agency on Science, Innovations and Information should ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU know-how and experience of ICT R&D policy development, indicators, monitoring and evaluation. *NB: The twinning project should complement current work being done by the Ukrainian Government in the IBRD funded project to develop a national statistics system for monitoring social and economic transformations.* Responsible Organisation(s): State Agency on Science, Innovations and Information Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 28): 5*
Recommendation #3 The Ministry of Infrastructure and Ministry of Education, Science, Youth and Sports should launch a competitive "ICT technology transfer" programme where consortia comprising HEI, public research organisations and industrial partners implement technology-transfer projects (from academic/public research organisations to industry). The programme should be largely "bottom-up" driven, where government defines broad ICT themes but consortia formulate their own specific proposal ideas and compete against each other. The programme should allow the participation of EU RTD actors as well as private companies. Responsible Organisation(s): Ministry of Infrastructure and Ministry of Education, Science, Youth and Sports. Timing: 2011-2015 *ICT Cooperation Barrier Addressed - Exhibit 28: 2 and Exhibit 29: 3*

Operational Level

Recommendation #1

Organise bi-annual SICA (Special International Cooperation Action) EU-Ukraine policy workshop focussed on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshop will be to agree on ICT research topics which could form the basis of EU-Ukraine SICA calls in a future FP ICT work programmes.

Responsible Organisation(s): State Agency on Science, Innovations and Information, Ministry of Education, Science, Youth and Sports and DG INFSO.

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 1 and 2 and Exhibit 29: 3

Recommendation #2

The State Agency on Science, Innovations and Information should fund the Ukrainian RTD community to regularly organise (e.g. on annual basis), FP ICT awareness raising/training workshops involving European ICT experts from RTD Community and Private Industry (through a bi-annual competitive call).

Responsible Organisation(s): State Agency on Science, Innovations and Information

Timing: 2011-2015

ICT Cooperation Barrier Addressed - Exhibit 28: 2 and Exhibit 29: 3

Recommendation #3

The Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA) should ask the European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv about the potential for funding an ENPI Twinning Project focused on transferring EU know-how on how to run an ICT based business incubator.

Responsible Organisation(s): Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA).

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 2 and Exhibit 29: 3

5.2 Recommendations for EU target audiences

Exhibit 34: Recommendations for EU ICT RTD community and Private Industry

RTD community and Private Industry
Strategic Level
Recommendation #1 Urge ETPs, EECA cluster, etc to recommend to DG INFSO to fund future dedicated EECA SICA projects as well as support actions aiming to boost cooperation between the EU's and Ukraine's ICT research and industrial communities in FP7 ICT throughout the FP7 programme (up to 2013) as well as prepare the ground for FP8 ICT (beyond 2013). Responsible Organisation(s): EECA cluster, SCUBE-ICT consortium, ETP's international relations secretariat. Timing: 2011-2015 *ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3*
Recommendation #2 The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the State Agency on Science, Innovations and Information about the potential for funding an ENPI Twinning Project focused on transferring EU know-how and experience of ICT R&D policy development, indicators, monitoring and evaluation. *NB: The twinning project should complement current work being done by the Ukrainian Government in the IBRD funded project to develop a national statistics system for monitoring social and economic transformations.* Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 28): 5*
Operational Level
Recommendation #1 Urge the Ukrainian research diaspora (i.e. Ukrainian researchers working in EU) and ETPs to support the organisation of SICA (Special International Cooperation Action) scientific workshops in EU focussing on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshops will be to pinpoint ICT research topics which could form the basis of EU-Ukraine SICA calls in future FP ICT work programmes. Present and recommend findings to DG INFSO as well as the State Agency on Science, Innovations and Information, Ministry of Education, Science, Youth and Sports. Responsible Organisation(s): Ukrainian research diaspora, ETP international relation secretariat, DG INFSO as well as the State Agency on Science, Innovations and Information and Ministry of Education, Science, Youth and Sports. Timing: 2011-2012 *ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 2*
Recommendation #2 Set-up agreements with Ukrainian leading RTD organisations for joint RTD experiments, internships, etc through suitable funding (e.g. FP Capacities programme) or other funding instruments. Responsible Organisation(s): EU leading ICT RTD actors Timing: 2011-2013 ICT Cooperation Barrier Addressed (Exhibit 28): 3

Exhibit 35: Recommendations for European Commission

DG Information Society and Media (INFSO), DG Research and EU Delegations
Strategic Level
Recommendation #1 The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the State Agency on Science, Innovations and Information about the potential for funding an ENPI Twinning Project focused on transferring EU know-how and experience of ICT R&D policy development, indicators, monitoring and evaluation. *NB: The twinning project should complement current work being done by the Ukrainian Government in the IBRD funded project to develop a national statistics system for monitoring social and economic transformations.* Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 28): 5*
Recommendation #2 The DG INFSO should fund future dedicated EECA SICA projects as well as support actions aiming to boost cooperation between the EU's and Ukraine's ICT research and industrial communities in FP7 ICT throughout the FP7 programme (up to 2013) as well as prepare the ground for FP8 ICT (beyond 2013). Responsible Organisation(s): DG INSFO Timing: 2011-2015 *ICT Cooperation Barrier Addressed (Exhibit 28): 1 and 3*
Recommendation #3 The Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA) should discuss potential ICT technology transfer support with the Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA). This project aims to support the development of technoparks and innovative clusters to support innovation and technology transfer. Responsible Organisation(s): Project Administration Office for the EU technical assistance project "*Support to knowledge-based and innovative enterprises and technology transfer to business in Ukraine*" (EuropeAid/127644/C/SER/UA) Timing: 2011-2013 *ICT Cooperation Barrier Addressed (Exhibit 28): 3*
Operational Level
Recommendation #1 DG INFSO in cooperation with SCIC and the Ministry of Education, Science, Youth and Sports of Ukraine should organise a bi-annual SICA EU-Ukraine policy workshop focussed on ICT research topics of common interest to Ukraine and EU. These topics are likely to be supercomputing, microelectronics, e-health and/or e-learning. The aim of the workshop will be to pinpoint ICT research topics which could form the basis of EU-Ukraine SICA calls in future FP ICT work programmes. Responsible Organisation(s): DG INFSO as well as State Agency on Science, Innovations and Information and Ministry of Education, Science, Youth and Sports. Timing: 2011-2013 *ICT Cooperation Barrier Addressed - Exhibit 28: 1 and 2 and Exhibit 29: 3*
Recommendation #2

Encourage key Ukrainian and European ICT research organisations to participate in the following three European Neighbourhood and Partnership Instrument (ENPI) programmes:

- Poland-Belarus-Ukraine Cross Border Cooperation (CBC)
- Hungary-Slovakia-Romania-Ukraine CBC
- Romania-Ukraine-Republic of Moldova CBC

Although not explicit schemes to support ICT cooperation, the priorities of the programmes allow such activities to be funded e.g. Priority 1 of P-B-U CBC - increasing competitiveness of the border area (which covers activities such as improving accessibility to education services e.g. e-Learning, and joint actions to promote and support research and business institutions). The programme is open to regional and local authorities, non-governmental organisations and non-profit organizations, as well as organisations, providing services on the field of culture, research or science.

Responsible Organisation(s): Joint Technical Secretariat (JTS) Cross Border Cooperation Programme and the European Commission's Delegation to Ukraine.

Timing: 2011-2015

ICT Cooperation Barrier Addressed - Exhibit 28: 1 and 3 and Exhibit 29: 2

Recommendation #3

The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the Ministry of Infrastructure, Ministry of Education, Science, Youth and Sports and Ukrainian Business Incubators and Innovation Centres Association (UBICA) about the potential for funding an ENPI Twinning Project focused on transferring EU know-how on how to run an ICT based business incubator.

Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv

Timing: 2011-2013

ICT Cooperation Barrier Addressed - Exhibit 28: 3 and Exhibit 29: 2

Recommendation #4

The European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv should discuss with the Ministry of Infrastructure and Association of Information Technology Enterprises of Ukraine (APITU) about the potential for funding an ENPI Twinning Project focused on transferring EU branding know-how and export promotion experience for the national IT outsourcing sector (e.g. between Ukraine's Ministry of Infrastructure and Romania's Ministry of Communication and Information Society, which helped implement RomaniaIT, www.romaniait.com).

Responsible Organisation(s): European Commission's Delegation to Ukraine and the EU's Twinning Programme Administration Office in Kyiv

Timing: 2011-2013

ICT Cooperation Barrier Addressed (Exhibit 29): 1

Recommendation #5

The Project Administration Office for the EU technical assistance project "*Joint Support Office for Enhancing Ukraine's Integration in the European Research Area*" (EuropeAid/127891/C/SER/UA) should discuss support for the establishment and training of national (and possibly regional) FP7 ICT national contact point (NCP) with the Ministry of Education, Science, Youth and Sports. This project will include capacity building for a local Joint Support Office to increase participation in FP7.

Responsible Organisation(s): Project Administration Office for the EU technical assistance project "*Joint Support Office for Enhancing Ukraine's Integration in the European Research Area*" (EuropeAid/127891/C/SER/UA)

Timing: 2011-2012

ICT Cooperation Barrier Addressed (Exhibit 28): 2

Annexes

Annex 1: Overview of ICT Policy Documents

Main policy documents concerning ICT policy adopted/published since 2000

Title of document (in English)	**Date** (of approval, publication, etc.)	**Organisation** responsible (Ministry, etc.)	**Legal status** (Law, Government Decision, strategy (white) paper, action plan, etc.)
National Programme of Information Society Development in Ukraine	1998	State Committee on Information Society Development	National Programme
Development of efficient intelligent high performance computers and means of information protection (Intellect)	2004	Presidium of National Academy of Sciences of Ukraine	National Programme
Laws of Ukraine "On electronic documents and electronic document circulation" and "On electronic digital signature"	2005	Verkhovna Rada of Ukraine	Law
Law of Ukraine "On telecommunications" and approval of "Conception of development of telecommunications till 2010"	2006	Verkhovna Rada of Ukraine	Law
Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015	2007	Verkhovna Rada of Ukraine	Law
Direction of the Cabinet of Ministries of Ukraine from 15 August 2007 N 653-p "On approval of the Action Plan to realize the tasks set by the Law of Ukraine concerning 'Main Priorities for Development of an Information Society in Ukraine for 2007-2015'"	2007	Cabinet of Ministries of Ukraine	Government Decision

Annex 2: Overview of ICT Policy Measures

Table A2.1: Policy Measure Fiche: overview

ICT PM Fiche Number	Title of measure	Information Details
UA_1	National Programme of Information Society Development in Ukraine (Національна програма інформатизації).	Overview The National Programme of Information Society Development in Ukraine (NPI) is a goal-oriented programme. It contains individual tasks (projects) planned for a fixed time period and aimed at implementing state ICT policy in coordination with a socio-economic programme for the country's development. During the past 10 years a sequence of six NPI have been executed. Background The Ukrainian ICT sector includes both manufacturing and service components: a set of electronic industry and telecommunication businesses has been developed and a number of enterprises produce software. Also, Ukraine has its own research and engineering potential able to support the ICT sector. However, the country's information society development is complicated by its relatively weak economy. Other issues impeding information society development in Ukraine are connected to shortcomings of state management, neglect of a system approach to planning of actions and measures and their bad coordination, in particular between contents of NPI, sectoral and regional ICT development programmes. In 1998, the Glushkov Institute of Cybernetics of the National Academy of Sciences established state scientific and technical policy to develop the country's information society approved by the state laws. Based upon assumptions of global information society development trends, Ukraine considers the establishment of such a society on its territory as one of its main national priorities. Duration 1998 – 2009 Budget 60m UAH, but originally 40% more was envisaged Administering Agency State Committee on Information Society Development 22 Khreshchatyk Str., Kyiv, 01001, Ukraine +380442263212 www.dki.gov.ua info@dki.gov.ua Manager Responsible for the Measure Igor Ruban Director of State Committee on Information Society Development +380442263212 iruban@stc.gov.ua References • http://dki.gov.ua/article/show/alias/npb • http://dki.gov.ua/article/show/alias/potoch_diyal
UA_2	Direction of Cabinet Council "On approval of National Programme of Information Society Development in Ukraine task (project) list of 2002, their state employers and amounts of financing" No	Overview The Direction of Cabinet Council approved the National Programme of Information Society Development in Ukraine (NPI) for 2002. The financing was divided into 8 directions and subdivided into 56 tasks. Background The main goals of the NPI were to continue forming national ICT policy, to increase the information support of key national development directions,

ICT PM Fiche Number	Title of measure	Information Details
	323-R from 13.06.2002	economy and social sphere, to develop information-analytical and eGovernment software systems of selected state agencies. Special funds were targeted towards development of the national Internet sector, to international cooperation and to education, science and culture (via the profile ministry). In contrast to previous years, some funded state agencies - including the Ministry of Education and Science - were given greater financial autonomy to implement their NPI tasks. Furthermore, a part of the programme budget was used to cover debts from work executed during the previous year. Duration 2002 Budget 7.3637m UAH (approx 1.5m euros) of State Budget plus 0.24m UAH (approx 50k euros) of other financing funds. Extra State Budget 0.6363m UAH (approx 125k euros) covered debt from implementation of the NPI during 2001. Administering Agency State Committee on Information Society Development 22 Khreshchatyk Str., Kyiv, 01001, Ukraine +380442263212 www.dki.gov.ua info@dki.gov.ua Manager Responsible for the Measure Igor Ruban Director of State Committee on Information Society Development +380442263212 iruban@stc.gov.ua References http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=323-2002-%F0
UA_3	The programme "Information development of general education and vocational schools, equipment with computers of general education schools primary in country-side, providing educational institution with modern technical means of education in natural-mathematical and technique subjects" in National Budgets of 2003-2006	Overview The programme was aimed at accelerating information technology development of Ukraine and support rural areas by introducing computer technology in school education. This included equipment with computers, development and distribution of computerized educational techniques, and increasing modern ICT availability throughout the country. Background The annual budgets for information development in general education and vocational schools are based on the state programme of information development and computerization in education. The programme was first started in the Soviet era and has developed over the intervening years in terms of its title, objectives, programme and measures. During 2003-2006, the programme was a part of the National Programme of Information Society Development in Ukraine (NPI), although it was not financed by NPI budget. Instead national budgets were assigned to it and charged according to other similar programmes: "Programme on information development of general education school, computerization of rural schools in 2001-2003", "State programme on information development and computerization of vocational schools in 2004-2007", "Complex programme on Equipment of general education, vocational and higher educational institutions with modern technical means of natural-mathematical and technical subject education". The latest programme is still active. Its current programme for 2005-1011 year has been approved by the Cabinet Council Direction No 905 from 13.07.2004. Duration 2001-2011

ICT PM Fiche Number	Title of measure	Information Details
		Budget Totally about 150m UAH per year (approx 15m euros) Administering Agency Ministry of Education and Science 10 Peremohy ave, Kyiv, 01135, Ukraine Tel.: +380444862442, fax: +380442361049 www.mon.gov.ua ministry@mon.gov.ua Manager Responsible for the Measure Oleksiy Gladkov Head of Sector of IT and Computerisation 16 Shevchenko blvd, Kyiv, 01135, Ukraine +380444863986 References • http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=239-2008-п • http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=905-2004-п • http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1300-2003-п • http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=436-2001-п
UA_4	Decision of Presidium of National Academy of Sciences of Ukraine "On approval of programme "Development of efficient intelligent high performance computers and means of information protection (Intellect)" No 308 from 24.12.2003; the programme "ICT in education and science on years 2006-2010" in National Budgets of 2006-2008	Overview This decision was concerned with the development of the National Academy of Science of Ukraine's (NASU) super-computer and remote calculation infrastructure for scientific research support and complex problems solution for government agencies. This task included implementation of information protection and development of problem oriented high-performance cluster (HPC) methods, software and IT. Background The development was initiated by the Cabinet Council and directly financed by the State Budget as a special programme of Cabinet Council. The programme principal organization was selected on a non-competitive basis. Glushkov Institute of Cybernetics being a headquarters institute of the NASU Department of Information was already experienced in HPC computers development. But particular projects of the programme were assigned on a grant base. As a result, some grant funded projects were awarded to state agencies including Security Service of Ukraine, Ministry of Transportation and Communications, Ministry of Industry Policy and Ministry of Economy. Duration 2004-2009 Budget 3.5m UAH (approx 0.5m euros) Administering Agency Department of Information National Academy of Sciences of Ukraine 54 Volodymyrska Str., Kyiv-30, 01601, Ukraine Tel.: +380442345167, fax: +380442343243 http://www.nas.gov.ua prez@nas.gov.ua Manager Responsible for the Measure Ivan Sergienko Director of Glushkov Institute of Cybernetics Tel.: +380445262008, fax: +380445267418 aik@public.icyb.kiev.ua

ICT PM Fiche Number	Title of measure	Information Details
		References http://www.nas.gov.ua/Activity/ScientificEffort/ComplexProgram/Pages/08.aspx
UA_5	Laws of Ukraine "On electronic documents and electronic document circulation" and "On electronic digital signature" enforced by Decision of Supreme Rada of Ukraine No 3175 from 01.12.2005 "Recommendations of Parliament hearings on issues of information society development in Ukraine"	Overview The Law "On electronic documents and electronic document circulation" regulates the terms that arise in the process of creation, sending, conveying, receiving, saving, processing, using and deleting of e-documents. The Law "On electronic digital signature" determines legal status of electronic digital signature and regulates relations that arise while using the electronic digital signature. Background These two laws create opportunities to develop e-services in Ukraine, starting from electronic document circulation through to more complicated services such as e-business and e-government. The laws also determine mechanisms of implementation of the given services primarily via the creation of centres of keys certification. Duration 2003 – till the emerging of new Laws that could bring changes in data Budget Not foreseen Administering Agency Verkhovna Rada of Ukraine (Верховна Рада України) Mailing Address: 01008, Kyiv, 5 Hrushevskoho Str. Citizens' Reception: 01008, Kyiv, 6-8 Bankova Str. (Porch 5) Web-address: www.rada.gov.ua Phone +38 044 255-42-46 Manager Responsible for the Measure Zaychuk Valentin Oleksandrovych Tel: 226-30-23 tel: 255-20-24 (Citizens' Reception) Tel: 255-21-86 e-mail: zaychuk@rada.gov.ua References • http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=851-15&p=1247470492715149 • http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=852-15&p=1247470492715149
UA_6	Law of Ukraine "On telecommunications" and approval of "Conception of development of telecommunications till 2010" (2006)	Overview The Law determines the authority of a country regarding management and regulation in the sphere of telecommunication and also rights and duties and the bases of responsibility of physical and juridical persons, which take part in the given activity or use telecommunication services. Background The law regulates the terms of market subjects of telecommunications regarding the assignment and reception of telecommunication services and use of telecommunication networks for general purposes. There is a classification of services in the telecommunication market within the law, where the base rules of interactions of telecommunication operators are determined and consumer rights protection are foreseen. The national committee on communication regulation is defined as the state organ of regulation in the sphere of telecommunications. The main responsibility of the committee is to provide licenses and registration in the sphere of telecommunication services. Duration 2003 – till the emerging of new laws that could bring changes in data

ICT PM Fiche Number	Title of measure	Information Details
		Budget Not foreseen Administering Agency Verkhovna Rada of Ukraine (Верховна Рада України) Mailing Address: 01008, Kyiv, 5 Hrushevskoho Str. Citizens' Reception: 01008, Kyiv, 6-8 Bankova Str. (Porch 5) Web-address: www.rada.gov.ua Phone +38 044 255-42-46 Manager Responsible for the Measure Zaychuk Valentin Oleksandrovych Tel: 226-30-23 tel: 255-20-24 (Citizens' Reception) Tel: 255-21-86 e-mail: zaychuk@rada.gov.ua References http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=1280-15&p=1247470492715149
UA_7	Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015 (Закон України Про Основні засади розвитку інформаційного суспільства в Україні на 2007-2015 роки)	Overview The goal of the measure is to describe the conceptual basis for defining targets regarding the development of an information society in Ukraine. The main strategic tasks, aims and tendencies towards the development of an information society in Ukraine are presented within the Law. The main framework for national policy and the legal organisational basis for development of an information society in Ukraine are determined. The Law governs the relations of state structures, scientific and educational organizations and private organizations. It forms the basis for the establishment of concrete programmes and plans for the development of an information society in Ukraine. Background In the late 1990's, a National Informatisation Programme was launched under the coordination of Glushkov Institute of Cybernetics. However, the current stage of the development of an information society in Ukraine is insufficient in comparison to world and does not correspond to the potential of Ukraine. If Ukraine is left to lag behind in the ICT sphere, it could lead to a considerable gap with developed countries in social and economic spheres as well. For this reason, the main aim of the Law is a harmonious combination of efforts of the country, society, trade unions, business and citizens regarding the development of an information society. The development of an information society in Ukraine and the introduction of up-to-date ICT into all spheres of society and in the activities of state authorities and local government institutions is one of the main priorities of state policy. The main strategic goals for information society development are as follows: • Formation and implementation of legal, organizational, scientific, technical, financial, economic and methodological conditions; • Comprehensive development of generally available information infrastructure; formation of motivation systems for the widespread implementation and usage of ICT; • Promotion of an increased range of information on-line services; • Creation of a system of widely available information resources; • Securing increased level of information literacy; • Involvement of general public into the creation of information society; • Elaboration and implementation of the national system of information society development indicators. Duration 2007 - 2015

ICT PM Fiche Number	Title of measure	Information Details
		Administering Agency Verkhovna Rada of Ukraine (Верховна Рада України) Mailing Address: 01008, Kyiv, 5 Hrushevskoho Str. Citizens' Reception: 01008, Kyiv, 6-8 Bankova Str. (Porch 5) Web-address: www.rada.gov.ua Phone +38 044 255-42-46 Manager Responsible for the Measure Zaychuk Valentin Oleksandrovych Tel: 226-30-23 tel: 255-20-24 (Citizens' Reception) Tel: 255-21-86 e-mail: zaychuk@rada.gov.ua References http://zakon.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=537-16
UA_8	Direction of the Cabinet of Ministries of Ukraine from 15 August 2007 N 653-р "On approval of the Action Plan to realize the tasks set by the Law of Ukraine concerning the Main Priorities for Development of an Information Society in Ukraine for 2007-2015'" "Розпорядження Кабінету Міністрів України від 15 серпня 2007 р. N 653-р 'Про затвердження плану заходів з виконання завдань, передбачених Законом України "Про Основні засади розвитку інформаційного суспільства в Україні на 2007-2015 роки'"	Overview The action plan determines the main tasks of the executive branch (ministry structures and regional administrations), in order to put into practice the enactments of the Law of Ukraine "On basic principles of information society development in Ukraine for 2007-2015". The plan specifies tasks to develop the country's information society and create significant socio-economic impacts. It contains proposals regarding the preparation of new Laws of Ukraine and amendments to existing ones. Furthermore, it specifies a national system of indicators and a monitoring system to track information society development. Finally, the objective of increasing financing of the national programme of informatization - including all projects on informatization - is defined. Background The ordinance of the Cabinet of Ministers of Ukraine defines a framework for establishing the main components of an information society in Ukraine. The creation of coordinating organ of the Cabinet of Ministries is proposed – interbranch council (rada) concerning development of information society as consultancy organ with representatives of central agencies of executive branch involving non-governmental organisations. Central and local government authorities of executive branch should choose authorised person among vice managers on issues relating to development of innovation society in order to provide state management of development of information society. The topic of pilot projects to form separate components of an information society is determined stressing the development of e-Government, e-Commerce, e-Health, e-Education and e-Safety. The development of e-Infrastructure and increasing collaboration with international structures in the sphere of information society is in of great importance. Duration 2007 - 2015 Administering Agency Cabinet of Ministries of Ukraine (Кабінет Міністрів України) Address 01008, Kyiv, 12 Hrushevskoho Str., 2 Phone +38 044 254-05-84 Website http://www.kmu.gov.ua Email pr@kmu.gov.ua References http://zakon1.rada.gov.ua/cgi-bin/laws/main.cgi?nreg=653-2007-%F0

Annex 3: Sources of further information

A3.1 Websites of key ICT organisations

Name of organisation (in English)	Website
Government and legislative bodies	
Legislative bodies	
Supreme Council (Verkhovna Rada of Ukraine)	www.rada.gov.ua
Committee (of Verkhovna Rada of Ukraine) on Science and Education	kno.rada.gov.ua
Committee (of Verkhovna Rada of Ukraine) on Freedom of Speech and Information	www.rada.gov.ua
Consultative Council on Informatization under Verkhovna Rada of Ukraine	www.rada.gov.ua
Government bodies	
Cabinet of Ministries of Ukraine	www.kmu.gov.ua
Ministry of Infrastructure	www.mintrans.gov.ua
Ministry of Education, Science, Youth and Sports of Ukraine	www.mon.gov.ua
State Committee of Informatization of Ukraine (Ministry of Infrastructure)	www.dki.gov.ua
State Administration of Communications in Ukraine (Ministry of Infrastructure)	www.stc.gov.ua
National Commission for Communication Regulatory Issues	www.nkrz.gov.ua
Private sector organisations and entrepreneurship promotion	
Associations	www.itukraine.org.ua
The Association of Information Technology Enterprises of Ukraine	www.apitu.org.ua
Ukrainian Hi-Tech Initiative	www.hi-tech.org.ua
Ukrainian Association of Communication Operators "Telas"	www.telas.Kyiv.ua
Ukrainian Internet Association	www.inau.org.ua
All Ukrainian Social Organization "IT-directors of Ukraine Community"	www.itdirector.org.ua
Independent Ukrainian Association of Broadcasting Activities (NAM)	www.nam.org.ua
Association of market participants of wireless datacom networks "Wireless Ukraine"	www.wirelessua.com
Union of Cable TV of Ukraine	www.sktu.info
Association of Ukrainian Television Network «Ukrteleset»	www.uts.dn.ua
Associations of ICT branch of Ukraine	www.eebc.net.ua
Telecommunication and content service	
"JSC Ukrtelecom" (part of state shares -92,8%)	www.ukrtelecom.ua
CJSC "Kyivstar JSM."	www.kyivstar.net
CJSC «Ukrainian mobile connection»	www.mts.ua
LLC "Astelit"	www.life.com.ua
CJSC "Ukrainian Radiosystems"	www.beeline.ua
CJSC "TVsystems of Ukraine"	www.people.net.ua
LTD "Інтертелеком"	www.intertelecom.ua
LTD "Velton Telecom"	www.velton.ua
Company "Golden Telecom"	www.goldentele.com
CJSC "Farlep-Telecom-Holding"	www.farlep.net
LTD «Optima Telecom»	www.optima.ua
SE RTC " Uarnet "	www.uar.net
Ukrainian-German joint venture "Infocom"	www.infocom.com.ua
CJSC "Datagroup"	www.datagroup.com.ua
LTD "Elvisti"	www.visti.net
Public organization "Internews-Ukraine"	www.internews.ua
LTD "International Communication Bank"	www.bigline.net
LTD "UkrNet"	www.ukr.net

Lucky.Net LTD	www.lucky.net
"Bigmir-Internet" ltd	www.bigmir.net
LTD "Publishing House ITC"	www.itc.ua
Telecommunication company "Intersviaz" ltd	www.isv.com.ua
EMPLOT LTD	www.emplot.net
Hardware and software, system integrators	
"Kvazar-Micro Techno"	www.kvazar-micro.com
JSC "Bancomsviaz"	www.bkc.com.ua
Corporation "Incom"	www.incom.ua
AMI	www.ami.ua
BMS Trading	www.bms.com.ua
"BMS Consulting"	www.bms-consulting.com
Bakotech	www.bakotech.com.ua
Data Link	www.datalink.com.ua
DataLux	www.datalux.ua
DiaWest	www.diawest.com
Everest	www.everest.ua
K-Trade Ltd	www.k-trade.ua
Leater	www.leater.com
MKS	www.mks.ua
MTI	www.mti.ua
Navigator	www.navigator.ua
Tekhnika dlya biznesu	www.tdb.com.ua
Unitrade Group	www.unitrade-group.com
Softline	www.softline.Kyiv.ua
"Information Techlogies"	www.it.ua
SoftServe	www.softservecom.com
ELEKS Software, Ltd.	www.eleks.com
ProFIX	www.profix.Kyiv.ua
Mirasoft Group	www.mirasoft-group.com
Telesens Ltd	www.telesens.com.ua
NIX Solutions Ltd.	www.nixsolutions.com
ENEX Group	www.enex.com.ua
Knowledge institutes (R&D and education bodies)	
Research institutes	
V.M.Glushkov Institute of Cybernetics of the Ukraine National Academy of Science	www.icyb.Kyiv.ua
Institute of Mathematical Machines and Systems Problems of the Ukraine National Academy of Science	www.immsp.Kyiv.ua
Institute of Software Systems of National Academy of Sciences of Ukraine	www.isofts.Kyiv.ua
International Research and Training Centre for IT&S NASU	www.irtc.org.ua
International Software Technology Research Centre "TechnoSoft	www.technosoft.Kyiv.ua
Institute for Informatics Registration Issues	www.ipri.Kyiv.ua
State Science-Research Institute of Information Infrastructure	www.dndiii.lviv.ua
The_Educational Scientific Complex 'Institute for Applied System Analysis'	www.ipsa.edu.ua
Universities	
National Technical University of Ukraine "Kyiv Polytechnic Institute"	www.kpi.ua

Taras Shevchenko National University of Kyiv	www.univ.Kyiv.ua
State University of Information-communication Technologies	www.duikt.edu.ua
National Aviation University	www.nau.edu.ua
State University of informatics and Artificial Intelligence	www.suiai.edu.ua
Ivan Franko National University of L'viv	www.lnu.edu.ua
National university "Lviv Politechnics"	www.lp.edu.ua
V.N.Karazin Kharkiv National University	www.univer.kharkov.ua
State University of Information Communication Technologies	www.duikt.edu.ua
National Technical University "Kharkov Polytechnic Institute"	www.kpi.kharkov.ua
Kharkiv National University of Radio and Electronics	kture.kharkov.ua
Kharkiv Aerospace University	www.xai.edu.ua
Donetsk National Technical University	www.donntu.edu.ua
Donetsk State University of Informatics and Artificial Intelligence	www.iai.edu.ua
Vinnitsa National Technical University	www.vstu.edu.ua
Odessa National Polytechnic University	www.opu.ua
Odessa National Academy of Telecommunications named after O.S.Popov	www.onat.edu.ua
Sumy State University	www.sumdu.edu.ua
ICT intermediaries	
Ukrainian Institute for Technical and Economy Information	www.uintei.Kyiv.ua
Kyiv State Centre of Scientific, Technical and Economic Information - NIP Ukraine FP7	www.fp7-ncp.Kyiv.ua
Ukrainian Centre of Innovatics and Patent Information Services	www.ip-centr.Kyiv.ua
National Institute for strategic Research	www.niss.gov.ua
Institute of Information Society	www.e-ukraine.org.ua
Lviv Centre for Scientific Technical and Economic Information	www.cstei.lviv.ua
Technology Business Incubator "Kharkov technologies"	www.kt.kharkov.ua
State Innovation Financing and Crediting Establishment	www.difku.gov.ua

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Books, articles, reports

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