I. ANNEX – Country Reports
I.1 Country Report Armenia

I.1.1 Current State of S&T & Major Policy Challenges

I.1.1.1 S&T Indicators

TABLE 5: S&T LANDSCAPE 2010

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
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<tr>
<td>0.27</td>
<td>81</td>
<td>5,460</td>
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I.1.1.2 Research Structure and Policy

A pressing challenge for Armenia is the reformation of its S&T and innovation system in accordance with the requirements of the market economy and needs of economic development. During the last decade several legal acts have been adopted in Armenia directed to the regulation and creation of favourable conditions for R&D and innovation activities.

In December 2000, the Armenian Parliament adopted the Law on Scientific and Technological Activity aiming at regulating interrelations between R&D performers, state bodies, and R&D outcome consumers, as well as outlining general principles of formation and implementation of state policy in the field of S&T. The Law prescribed the Ministry of Education and Science (MES) as a state authorised body to develop and coordinate S&T policy-making. By government resolution as of September 2006, the Ministry of Trade and Economic Development was recognised and authorised as the body responsible for the development and implementation of innovation policy, in cooperation and coordination with other concerned ministries and organisations.

In order to improve policy-making and promote the coordination in the field of S&T, in October 2007 the government decided to establish the State Committee of Science empowered to carry out integrated S&T policy in the country. This structure is answerable to the Ministry of Education and Science, but with wider power of independent activity. The Committee is also responsible for the development and implementation of research programmes in the country through three main financing mechanisms: thematic (project based) financing, basic financing and special purpose projects.

The law on the National Academy of Sciences of Armenia (NAS RA) was adopted by Parliament on 14 April, 2011, which assigned to it the status of highest self-governing state organisation and empowered it to coordinate and carry out basic and applied research directed to the creation of a knowledge-based economy, and the social and cultural development of the country. This Law gave more power to the Academy and its research institutes in carrying out business activities towards the commercialisation of R&D outcomes and the creation of spin-offs.

In May 2010, the Government adopted the Strategy on Development of Science in Armenia, which outlined the state policy towards the development of science from 2011 to 2020.

Based on this strategy, in 2011 the government approved the Action Plan 2011-2015 on the development of science in Armenia which incorporates the following targets for the stated period:

- Improving the S&T management system and ensuring adequate conditions for sustainable development;
- Taking measures to increase the number of young and talented specialists involved in research, education and technological development, and to upgrade of research infrastructure;
- Creating adequate conditions for the development of integrated science, technology and innovation systems;
- Developing international cooperation in RTD.

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73 State Committee of Science, http://www.scs.am/
One of the main positive aspects of the latest adopted policy documents is the existence of quantitative targets to measure the success of implementation of envisaged measures.

Several other governmental acts and decisions have also been adopted directed to the regulation of S&T and the innovation policy of the country.

In May 2001, the government approved the concept for the development of an information technology industry in Armenia. It emphasises the existence of an adequate potential in the country for the development of an IT sector, and the need for further improvement of the infrastructure and legislation supporting development of the IT industry.

In May 2010, the government issued a new resolution on Science and Technology Development Priorities for 2010-2014 in the Republic of Armenia. These priorities are stated as follows:

- Armenian Studies, Humanities and Social Sciences
- Life Sciences
- Renewable Energy, New Energy Sources
- Advanced technologies, Information Technologies
- Space, Earth Sciences, Sustainable Use of Natural Resources
- Basic research promoting applied research of vital importance

In 2009, the total budget allocations to R&D amounted to around 8.4 billion AMD (around €18 million).

I.1.1.3 Important Research Organisations

The National Academy of Sciences of Armenia (NAS RA) with around thirty-five affiliated research institutes and centres remains the main R&D performing organisation in Armenia. The Academy promotes and carries out fundamental and applied research in different scientific fields, as well as coordinates basic research carried out throughout Armenia.

The new Statute of the National Academy of Sciences of Armenia was approved by the government in May 2011, based on the Law on the National Academy of Sciences of Armenia, allowing the Academy to carry out wider business activities towards the commercialisation of R&D outcomes and the creation of spin-offs. The Presidium of NAS RA has five scientific divisions pertaining to particular areas of science:

- Division of Mathematical and Technical Sciences
- Division of Physics and Astrophysics
- Division of Natural Sciences
- Division of Chemistry and Earth Sciences
- Division of Armenology and Social Sciences

In November 2006, the Armenian government adopted a resolution to optimise the Academy infrastructure and to restructure some of its institutes through amalgamation and creation of scientific and technology centres. This decision was aimed at improving the coordination of research activity in the institutes involved in overlapping or closely related research disciplines, the more efficient use of scarce financial resources and promoting commercialisation of research outcomes. For example, the Scientific and Technological Centre of Organic and Pharmaceutical Chemistry was created through the merging of the Institute of Fine Organic Chemistry, the Institute of Organic Chemistry and the Molecular Structure Research Centre.

The higher education system in Armenia consists of twenty-two public and over seventy private institutions of higher education (IHEs). From 2000 on, the system of higher education in the country has started to reform itself along the lines of the European models as per the Bologna agreement. Unfortunately, there are no statistical data on the dynamics of R&D intensity in the university sector to analyse trends during recent years. However, based on general observations and personal interviews, it can be stated that university R&D is increasing, particularly in leading state universities. The universities are more flexible in redirecting revenues from tuition fees to the modernization of research laboratories and funding research activities.

The leading universities of Armenia are Yerevan State University, State Engineering University of Armenia, State Medical University, State Agrarian University, Russian-Armenian State University, French University, and American University of Armenia (AUA). AUA was founded in 1991 and, parallel to its academic programmes, the Centre for Business Research and Development, the

74 State Committee of Science, http://www.scs.am/
75 http://www.sci.am/resorgs.php?langid=1#1
76 http://www.sci.am
Engineering Research Centre, the Centre for Policy Analysis, the Centre for Environmental Management and Research, the Centre for Health Services Research, and the Legal Resource Centre operate to promote research in conjunction with graduate teaching. AUA faculty members are invited to promote learning and knowledge by teaching and conducting research.

Dramatic downsizing of R&D intensity, starting from the early 1990s after the collapse of the former Soviet Union, mostly affected branch and enterprise research institutes, which were involved in applied research and answerable to local or Moscow-based industries or ministries. The vast majority of these enterprises have been privatised during the last decades, and stopped or reoriented their activities by shutting down RTD divisions.

Among the operating leading branch research institutes are the Yerevan Physics Institute (YPI) – one of the leading research centres involved in high-energy physics research, the Yerevan Computer Research and Development Institute, and the Yerevan Automated Control Systems Research Institute.

There is also a number of small enterprises involved in innovative R&D activities. Such enterprises could play an essential role in the economic development of the country, but they face a number of problems, such as:

a. shortage of qualified specialists in the field of technology transfer, commercialisation, and management, and lack of innovation support intermediary organisations;

b. low awareness of intellectual property related issues among businessmen involved in technological development;

c. lack of financial institutes and venture capital funds offering loans with acceptable conditions.

I.1.2 Current Trends & Challenges in International Cooperation

I.1.2.1 National Policies
All the policy and strategy documents adopted during the last few last decades related to the regulation and the development of S&T and Innovation in Armenia, stress the importance of the development of international cooperation in the field of sciences and technology, and a better positioning of the country in the international research and development environment. In particular, the Law on Scientific and Technological Activity, the Strategy on Development of Science and Action Plan 2011-2015 on the development of science in Armenia include the development of international cooperation in RTD as one of the main challenges.

I.1.2.2 Bilateral Agreements
At intergovernmental level, during 1991-2005 S&T and/or cultural cooperation agreements were signed with around twenty EECA and EU-member states, including France, Greece, Romania, Slovakia, Bulgaria, Cyprus, Portugal, Poland, the UK, Russia, Ukraine, Belarus, Georgia, Kyrgyzstan, Tajikistan and Turkmenistan. During this period S&T and/or cultural cooperation agreements were also signed with Argentina, China, India, Iran and the USA.

The State Committee of Science of Armenia and CNRS (France) signed a bilateral cooperation agreement in January 2009. The agreement provides the framework for exchanging scientists of the two countries, implementation of joint scientific and research programmes, organisation of joint scientific conferences and seminars. The joint programme is implemented with the contributions of both sides. Within the framework of this cooperation, a trilateral agreement on the establishment of joint laboratories was signed between CNRS, the National Academy of Sciences and the State Committee of Sciences in November 2010. So far, three laboratories have been established in the fields of geological sciences, archaeology and physical research.

NAS RA has cooperation agreements with the Academies of Sciences of the Russian Federation, Belarus, Ukraine, Turkmenistan, Georgia, Hungary, China and a Memorandum of Understanding with the Indian National Science Academy.

Being among the leading universities of Armenia, the Yerevan State University, the State Engineering University of Armenia, the Yerevan State Medical University and the State Agrarian University maintain wide international cooperation within cooperation agreements in the field of education and research with various universities and research centres in more than thirty countries of the world, including Russia, Great Britain, France, Italy, Germany, Greece, Spain, Sweden, Japan, China, Poland, the USA, and others.

I.1.2.3 Regional Network / Cooperation
In 1992 the National Academy of Sciences of the Republic of Armenia (NAS RA) joined the International Council for Science (ICSU). NAS RA is also a member of the International Academy Panel on International Issues, the International Association of Academies of Sciences, and the Council of Academies of Sciences of BSEC Countries.
According to the ISI database, Armenian scientists published 4,347 SCI articles and 112 SSCI and AHCI articles in 1997-2007. Armenia has, after Russia, the second highest number of international publications per million inhabitants, reaching 136 articles in 2007. The country also has the highest average number of publications related to its GDP – 24 in 2007. The latter figure is probably due to the important role of Armenian Diaspora.

The main research area of the published articles is predominantly Physics and Astronomy (39.4%) followed by Chemistry (9.81%) and Mathematics (7.91%)77. The Yerevan Physics Institute with 1,689 articles in ISI Web publications clearly leads the list of Armenian institutions’ publications while all publications under NAS RA total 1,192. The gap with the next in the list – Byurakan Astrophysical Observatory that has published 193 articles – is already outstanding. Among those with more than one hundred publications in ISI database are the State Engineering University of Armenia (108) and the Yerevan State University (108).

Armenian scientists’ international articles are most often written in co-authorship with French, German, Italian, Russian, and US researchers. In general, the number of countries from which the co-authors for Armenian scientists’ publications come is not very high; only thirty-seven from 1997-200778.

In 2010, Armenia’s National Academy of Sciences in cooperation with the French Centre National de la Recherche Scientifique (CNRS) established three joint laboratories in Armenia. One of the laboratories was established in conjunction with the Institute for Physical Research, the second with the Institute of Geology, and the third with the Institute of Ethnography and Archaeology.

The annual funding of these laboratories is split equally between the two parties: the Armenian side is the State Committee of Science.

Since 2004, a Joint Research Expedition on hydro-ecological investigation of Lake Sevan has been launched jointly with the National Academy of Sciences of the Russian Federation.

The Joint Scientific Experimental Centre (JSEC) which operates from the Institute of Zoology of NAS RA opened jointly with the Centre of Zoology and Hydro-ecology of NAS RA and the Centre of Parasitology with-in the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences.

In June 2011, the first Regional Mobile Application Laboratory (mLab) for Eastern Europe, South Caucasus and Central Asia (ECA region) was launched by the Enterprise Incubator Foundation in Armenia. Through a competitive tendering process, EIF was selected from a pool of more than fifteen candidates as a host for the mLab, where local and regional companies, technologists and experts can collaborate to develop locally relevant applications that meet user demands.

The mLab ECA is funded by infoDev, a donor-funded programme in the World Bank’s Financial and Private Sector Development Vice Presidency, as part of the Government of Finland and the Nokia joint programme on Creating Sustainable Businesses in the Knowledge Economy.

The mLab will be the focal point to increase the competitiveness of innovative enterprises working on mobile content and applications in the region. It will serve as a platform for the development of technical and business skills, personal contacts and relationships needed to build scalable mobile solutions into flourishing businesses.

The mLab will provide a wide range of innovation support services, including organisation of training, business mentoring, ideas generation and grant matching. Its management and expert team will work with mobile application developers in the region to assist them in product development and promotion, connecting them with potential investors, academic experts, and public sector leaders. A new mobile application testing environment was set up as well. The mLab ECA planned to start its operation in mid 201179.

I.1.2.4 European Neighbourhood Policy
New prospects for a closer EU-Armenia cooperation were opened after the inclusion of Armenia into the European New Neighbourhood Policy (ENP) Initiative and the further development of the ENP Action Plan aiming at contributing to the sustainable economic development of the country. The ENP Action Plan includes the article on measures in the field of S&T incorporating points towards assisting in the development of adequate S&T and Innovation policy system reformation activities and the creation of an independent peer review structure for competitive selection of RTD projects in Armenia. It also contains an article stating the need for a closer integration of Armenia into the Euro-

77 SCImago database, published articles in peer-reviewed journals in 2007.
78 ISI WoK, 2008
79 Enterprise Incubator Foundation, http://www.eif.am
European Research Area through a more active promotion of the participation of Armenian research organisations in the EU's Framework Programmes. The European Commission assistance to Armenia mainly takes the form of Annual Action Programmes under the European Neighbourhood and Partnership Instrument (ENPI). Other funding sources are the Instrument for Nuclear Safety Cooperation (INSC) or the thematic assistance programmes, concentrating for example on human rights or civil society.

The EU wants to support the development of an increasingly close relationship with Armenia in the context of the European Neighbourhood Policy (ENP) and based on the objectives defined in the Partnership and Cooperation Agreement (PCA) and the EU-Armenia ENP Action Plan.

The European Commission's assistance focuses in particular on strengthening democratic structures and good governance, on support of regulatory reform and administrative capacity building and on poverty reduction.

The Armenian-European Policy and Legal Advice Centre (AEPLAC) was set up with EU funding in order to support the country's economic, political and social development. Work here embraces the principles set out in the Partnership and Co-operation Agreement (PCA) and ENP Action Plan which outline relations between the EU and Armenia. The EU contributes to the protection of the environment in the Kura river basin.

An EU project has established a Chair for European and International Law, as well as a Centre for European Studies, European and International Law at Armenia's Yerevan State University. The project intends to secure the services of qualified professionals in the field of European legislation, as well as experts in European business, economics and political science.

In 2008, the European Commission continued to support the national reform efforts in Armenia and programmed assistance for a total amount of €24 million under the European Neighbourhood Partnership Instrument (ENPI). The 2008 Annual Action programme included a sector budget support operation on Support to Justice Reforms.

This support was part of an indicative amount of €98.4 million, which was allocated for the period 2007-10 under the ENPI.

With regard to nuclear energy, the EC continued to assist in ensuring minimum safety standards for the Medzamor Nuclear Power Plant (2006 budget). Further support, amounting to €7.2 million, was provided within the Action Plan 2007 under the Instrument for Nuclear Safety Cooperation.

I.1.2.5 Partnership and Cooperation Agreements (PCAs)

A Partnership and Cooperation Agreement between the EU and Armenia was signed in April 1996 and came into force at the beginning of July 1999. It serves as the legal basis for the development of cooperation including the field of S&T.

Article 51 on Cooperation in science and technology of the Agreement states that the Parties shall promote cooperation in civil scientific research and technological development (RTD) on the basis of mutual benefit and, taking into account the availability of resources, adequate access to their respective programmes and subject to appropriate levels of effective protection of intellectual, industrial and commercial property rights (IPR).

I.1.2.6 National and bilateral programmes

• Fostering scientific cooperation within the framework of joint research projects in all fields of exact, natural, social and human sciences between CNRS (France) and SCS (the State Committee of Science of the Republic of Armenia); Start date: January 2009, end date: open
• Call for joint bilateral basic research projects for 2011 between BRFFR (BY) and the State Committee of Science (AM); Start date: February 2011, end date: open
• Pilot Joint Call (PJC) of interested programme owners in the Member States of the European Union (MS), the Associated Countries to the 7th Framework Programme (AC) and the extended Black Sea region within FP7 Black Sea ERA.NET project is to promote collaborative research on Environment and Energy. Participating countries were Armenia, Azerbaijan, Bulgaria, France, Georgia, Germany, Greece, Italy, Moldova, Romania, Turkey, and Ukraine. The implementation of this Pilot Joint Call is an early step towards meeting the overall aim of the Black SeaERA.NET project, namely, the development of a Black Sea Research Programme (BSRP). Start date: September 2010, end date: January 2011.

None of the existing National Research Programmes in Armenia is open for foreign researchers.

80 http://ec.europa.eu/europeaid/where/neighbourhood/country-cooperation/armenia/armenia_en.htm
I.1.2.7 The EU Framework Programme for Research and Technological Development

Taking into consideration the importance of creating a European Research Area and the Armenian integration into it, with the aim to encourage an adequate participation of Armenian researchers in the Community R&D Programmes, on the joint initiative of the European Commission and INTAS, a National Information Point (NIP) for the European Union Framework Programme for Research and Technological Development was established in Armenia at the beginning of 2004. The main objective of the NIP was to promote a more active participation of Armenian Academic institutes, universities and branch (ministerial) research institutions and SMEs in European research programmes through a wider dissemination of information about the European Research Area and Framework Programmes and provide consultancy to the Armenian research community.

One of the NIP’s long-term objectives was to set up NCPs of FP thematic priorities which would become a part of the well established European NCP Network. In early 2007, three years after the fruitful activity of NIP, five NCPs headed by the National Coordinator NCP were established, namely, SME NCP, ICT NCP, SiS NCP, INCO NCP and Legal & Financial NCP. In March 2009, two more NCPs were officially nominated by the RA Ministry of Education and Science: People NCP and Health NCP. The NCP system is hosted by the National Academy of Sciences of Armenia.

One of the main problems of the NCP system in Armenia is the absence of dedicated financial support from local authorities. The National Academy of Sciences submitted a proposal to the State Committee of Science asking to allocate special funding for activities of the NCP system but the issue is still pending. Another possible solution might be the allocation of some funding for NCP system within ENPI or Eastern Partnership Initiatives. For instance, following the EC decision, during 2010 Eastern Partnership country NCP Coordinators and Legal and Financial NCPs were funded to attend NCP meetings and information days in Brussels.

As of October 2010, Armenian research teams have submitted around 106 project proposals for FP7, of which twenty-two were successful with the following FP7 thematic distribution: Health –1, ICT –3, Environment –1, ResInfra –5, People –5, INCO –7. All in all, Armenian research teams have received around €1,000,000 in EC contributions. According to preliminary results of the FP7 –INCO-2011-6 ERA WIDE Call for Proposals on reinforcing cooperation with Europe’s neighbours in the context of ERA, three projects with Armenian participation were invited for negotiation in 2011. The involved Armenian institutes are the Centre for Ecological & Noosphere Studies of NAS RA, the Institute for Informatics and Automation Problems of NAS RA and the Institute for Physical Research of NAS RA. The total budget of the three projects is around 1.5 m Euros.

I.1.2.8 European Neighbourhood Policy Instrument (ENPI)

The European Commission assistance to Armenia mainly takes the form of Annual Action Programmes under the European Neighbourhood and Partnership Instrument (ENPI). Other funding sources are the Instrument for Nuclear Safety Cooperation (INSC) or the thematic assistance programmes, concentrating, for example, on human rights or civil society.

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With regard to nuclear energy, the EC continued to assist in ensuring minimum safety standards for the Medzamor Nuclear Power Plant (2006 budget). Further support, amounting to €7.2 million, is provided within the Action Plan 2007 under the Instrument for Nuclear Safety Cooperation\textsuperscript{81}.

I.1.2.9 Lifelong Learning Programme (LLL)
So far there has been no participation of Armenia in Comenius, Erasmus, Leonardo da Vinci and Grundtvig programmes.

The TEMPUS programme has been opened in Armenia since 1995. In this period forty-five projects with participation of Armenian teams and sixty individual projects were funded by TEMPUS in Armenia. Thirty four applications with Armenian participants were submitted of which four were successful. For the 2010 call there were forty-five applications. The selection procedure is not yet finalised but it is expected that three to five projects with Armenian participation will be funded.

Best Practice example: A new master’s programme in Applied Biosciences (MAPB) has been designed at the Faculty of Biology of Yerevan State University and the Armenian State Agrarian University within the framework of the TEMPUS Programme in partnership with other regional and European Universities, such as the Tbilisi State University, the Akaki Tsereteli State University, the Georgian State Agrarian University, the University of Alicante (Spain), the University of West of England, the Aristotle University of Thessaloniki and the P&B Consulting Company (Portugal). The programme offers specialisation courses designed to prepare highly qualified professionals in applied biosciences and biotechnology as well as narrow-profile specialists in the spheres of their interest. Each student can choose to follow one of four alternative strands: Healthcare, Environmental, Food and Agro-biotechnology. The curriculum is designed for degree completion in two years and includes a research internship either in an academic laboratory, partner universities or in industry.\textsuperscript{82}

Erasmus Mundus: In the framework of Erasmus Mundus Action 2 “Partnership for Armenia, Georgia and Azerbaijan” which aims at fostering structured cooperation between European and Third Country higher education institutions through the promotion of mobility at all level of studies for students (undergraduates and master’s), doctoral candidates, researchers, academic and administrative staff, thirty-nine individual mobility activities were foreseen for the academic year 2010/2011 with the participation of Armenian students with the following distribution by levels of study: Undergraduates –14, Master’s –9, Doctorates –9, Post-doctorates –2, Staff –5.

I.1.3 Challenges
The Armenian government has adopted conceptual and legal documents in the sphere of S&T and innovation that include an array of measures and tasks to be implemented by 2015 concerning the reformation of S&T and the innovation management system in Armenia. These include defining priority areas in the R&D and innovation sphere; measures on preventing brain drain; motivating young specialists to pursue a research career; creating and improving legal, taxation, credit, and customs policies; updating the research and technological basis of research institutes and science-intensive branches of the economy; promoting academy-university-industry partnerships; promoting private business involvement and investment in R&D and innovation programmes; development of international cooperation in RTD and a better positioning of Armenia in the European and International Research Area; adoption of a strategy on the development of science, and based on this strategy, an Action Plan 2011-2015. Based on challenges stated in the aforementioned documents and trends in the R&D input and innovation driver statistical indicators, we can formulate the main challenges as follows:

R&D intensity (GERD/GDP ratio) has decreased dramatically in Armenia since the collapse of the former Soviet Union, dropping from 2.5% in 1990 to 0.27% in 2009, which is unprecedented among other CIS countries. This level has remained nearly unchanged since the mid-1990s. This decline is reflected also in the number of researchers and research institutes, which decreased nearly four-fold and two-fold, respectively.

Official documents adopted by the Armenian government regarding R&D and innovation do not set concrete quantitative targets for increasing R&D expenditure. The Law on Scientific and Technological Activity of 2000 initially contained an article obliging the government to increase R&D financing up to 3% of the budget expenditure, but later this article was removed from

\textsuperscript{81} http://ec.europa.eu/europeaid/where/neighbourhood/country-cooperation/armenia/armenia_en.htm
An integral part of this challenge is the consistent increase of participation of the business sector in the whole chain of knowledge creation and application. Currently, no reliable statistical data are available on business expenditure on R&D in Armenia. A presentation of the President of the National Academy of Sciences of Armenia in 2006 mentioned a business expenditure on R&D of around 10%, though this figure reflects non-budget expenditure on R&D, including contract works and international sources. Thus, it can be estimated that the real business expenditure rate is lower and probably insignificant.

Other challenges of the Armenian S&T and innovation system can be formulated as follows:

- Absence of a systemic approach to S&T and innovation policy-making based on an objective analysis of the current situation and general economic development priorities of the country;
  - Envisaged actions to address this challenge: Creation of the State Committee of Science (SCS RA) empowered to carry out integrated S&T policy in the country, adoption of the Strategy and Action Plan 2011-2015 on Development of Science in Armenia, Law on the National Academy of Sciences of Armenia and adoption of Science and Technology Development Priorities for 2010-2014. SCS RA expressed a strong interest in involving Armenia in benchmarking of S&T policies in EECA to be carried out within IncoNet EECA Project.

- Budget allocations to RTD sector remain extremely low (less than 0.3% of GDP);
- Lack of incentives for private/business sector to invest in RTD and commercialise innovative results;
  - Envisaged actions to address this challenge: A new programme for research projects was launched by the SCS RA in 2011 with the requirement for a partnership with industrial enterprise and up to 15% project co-funding by this industry partner.

- Dispersed research infrastructure and the existence of many overlapping research institutes and teams, which have experienced problems with obsolete infrastructure and facilities, and ageing staff/brain drain;
  - Envisaged actions to address this challenge: a) Government resolution to optimise the Academy infrastructure and to restructure some of its institutes through merging and creation of scientific and technology centres; b) new infrastructure grant programme is launched by the SCS; c) new programme is launched for young researchers not older than 35 years; d) project based funding scheme which requires involvement of young researchers in the project teams; e) a programme of stipends for one hundred talented young researchers is launched.

- Lack of statistical data to adequately evaluate S&T and innovation performance, and make internationally comparable analysis.
I.2 Country Report Azerbaijan

I.2.1 Current State of S&T & Major Policy Challenges

It should be emphasized that Azerbaijan’s economic structure is distinctly different from that of most European countries – there is an almost complete lack of high-tech, consumer goods industries. Therefore, Azerbaijan’s national innovation system has a quite distinctive outlook. In Azerbaijan there is no high-level government policy body which could establish priorities and create a legislative framework for the implementation of the National RD&I Strategy in accordance with the objectives and sectional strategies of the Government Programme and in consultation with local and central public administration bodies, the ANAS, higher education organisations, RTD institutes, economic agents, employers’ federations and labour unions, etc.

Innovation activity takes place and scientific research is performed by a few private companies, primarily small innovative firms. Such ventures have the potential to be important engines for the economic development, but face several significant hurdles, including: 1) a shortage of qualified specialists trained in technology transfer, marketing, and management; 2) a general lack of understanding of intellectual property issues and laws among technology entrepreneurs; and 3) a lack of available credit on reasonable terms. Together, these factors make the successful commercialisation of the products of research very difficult.

Some Azeri companies have entered into partnerships with foreign companies in various ways (such as joint ventures, research contracts, and cooperative research projects) in order to get access to the latest technology as well as to gain managerial and marketing experience. At the same time Azeri research organisations have been very passive in mobilising foreign support and research contracts.

Generally, Azerbaijan does not currently have a formal national R&D and innovation strategy plan or a formal national innovation policy framework. “Innovation policy” has not been formally debated at all by the Azeri government. There have been some government sponsored gatherings to encourage innovation activity but they are carried out sporadically.

The national innovation system of Azerbaijan is at an early stage of its development. It is necessary to have a variety of the intermediary organisations which should promote the further development of innovative systems in the country. There are some more unresolved problems in the field of innovation systems to be addressed: 1) the absence of an understanding of the essence and the meaning of an innovation system among politicians; 2) a necessity to develop a system of venture investment (off-budget financing of projects with high risk) in the scientific and technical sphere; involving objects of the intellectual and industrial property in economic circulation and maintenance of reliable protection against unauthorised use; 3) the development of a methodological manual on innovations for receiving comparative results at international level.

Currently, there are no think tanks, lobby groups, political bodies, trade associations, or employers’ associations in the country to champion innovation. Different government organisations should be involved in the innovation process, but they tend to operate in relative isolation without a clear and shared policy vision. The government does not encourage a more active role of lower levels of the government in promoting innovation in local industries, and promoting mutual policy learning and networking between policy-making at regional and national levels. However, in some sense, innovation issues are included into a large number of State Programmes which have been approved during the last 10 years. These programmes have their own objectives and targets and some of them could be interpreted as objectives of the innovation policy of the government. Unfortunately, in many cases, these objectives are not quantified and specific targets are not set.

The Government’s attempts to increase the role of innovation – implicitly as opposed to explicitly – are expressed

Policy response ranking scored from 1 to 5:

i. No specific measures addressing the challenge (possibly a debate but no evidence of any real policy development);

ii. Policy development under way to respond to challenge (policy debate or design launched, e.g. announced in National Lisbon Reform Plan, etc.);

iii. Specific measures existing for some time, but insufficient to respond fully to challenge;

iv. Existing measure plus one or more newly launched measures (during last 18 months);

v. 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.

### I.2.1 S&T Indicators

**TABLE 7: S&T LANDSCAPE 2010**

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### I.2.1.2 Research Structure and Policy

It is noteworthy that the Government of Azerbaijan applies all financial control mechanisms: the Ministry of Finance allocates funds for material expenditure, research projects, junior researcher employment and approval of vacancies for new appointments.

In general, governments mainly finance basic research. However, the Azerbaijan government finances applied research twice as much as usual. In 2003 out of current domestic expenditures for RTD, 25.1% was spent on basic research, 61.6% on applied research and 13.3% on development.

Priorities: as the statistics shows in 2003, 37% of the current domestic expenditures on RTD were spent on

### TABLE 6: INNOVATION CHALLENGES, POLICY RESPONSES AND IMPACT

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Relevance of policy response</th>
<th>Evidence of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elaboration of the state RTD and Innovation strategy</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>Renewal of knowledge base, including improvement of research quality and capacity for innovation</td>
<td>3</td>
<td>N/A</td>
</tr>
<tr>
<td>Increasing the competitiveness of traditional industries by the introduction of new technologies</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Promoting the creation of new high technology firms</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

technical sciences, 31% on natural sciences, 15% on humanities, 6% on agricultural sciences, 8% on social sciences and 4% on medicine.

Researchers in Azerbaijan are allocated in
a) Research Institutes of the Azerbaijan National Academy of Sciences
b) Branch Institutes of different ministries
c) The Higher Education sector
d) R&D units in the private sector

I.2.1.3 Important Research Organisations

The highest scientific body of the country is the Azerbaijan National Academy of Sciences (ANAS) that unites all the leading scientific research institutes. The Azerbaijan National Academy of Sciences (ANAS) was appointed by the last Presidential decree as an organisation which carries out RTD policy in the Republic, coordinates and directs the scientific research in all state research and educational centres, and represents Azerbaijan in the area of scientific and technological development in foreign countries.

There are currently 146 RTD organisations, including ninety-three National RTD Institutes coordinated by the ANAS and by eight ministries: Ministry of Economic Development, Ministry of Health, Ministry of Agriculture, Ministry of Environment and Natural Resources, Ministry of Communications and Information Technology, Ministry of Transports, Ministry of Labour and Social Protection and Ministry of National Defence.

Most RTD organisations are active in technical and engineering sciences, with specialisation profiles corresponding to various branches of processing industries. Other RTD institutions are active in agricultural sciences, natural and exact sciences, medical sciences, social sciences and humanities.

The institutes of ANAS include most of the country’s research organisations. The ANAS has forty-five organisations which are divided into six divisions. According to the ANAS Presidium, the Academy and its various institutes and centres employ nearly 10,000 people. Activity of the ANAS is mostly financed from the state budget.

The institutes which are in submission of the various ministries (branch institutes), do not concern the state budget but are financed by those ministries to which they are answerable. They carry out concrete orders of the branch, industrial enterprises, and also perform works on the basis of foreign grants.

It is necessary to note, that the number of organisations conducting research and development, the number of personnel occupied in this field, but also expenses spent on R&D have grown over the past years.

The ruling organisation which should regulate scientific and technological development and innovation in the country is unspecified. There is no Ministry of Science or Scientific Research in Azerbaijan. Based on the President’s decree issued at the beginning of 2009, the ANAS is considered to be the main organisation which provides and organises the development of science in the Azerbaijan Republic, it carries out the scientific and technological policy of the state, connects and leads the scientific research activity in all scientific and educational institutions. Furthermore, according to this decree, the duties of the ANAS are to participate in or to make suggestions regarding the determination and qualification of the directions of scientific development and, in general, the directions of the scientific and technological policy. At the same time it is noted in the regulations of the Ministry of Economic Development of Azerbaijan that the Ministry participates in the formation of the state innovation and the science and technology policy. That means that at present, there is no concrete body which could determine the priorities of the science, technology and innovation policy of the country.

Higher Education organisations: there are forty-seven higher education institutions in total, including thirty public universities and seventeen accredited private universities. The S&T profile of the higher education system shows the highest concentration of students in the technical area followed by medical and basic sciences.

Scientific research institutes and universities are mostly located in Baku. There are however scientific research institutes and universities in large cities of the republic, such as Sumgait, Ganja, Lankaran, Nakhchivan, etc.

Currently, the Azerbaijan’s research sector employs about 28,000 employees (all ranks) of which 80% are researchers. During the transitional period, this part of the RTD system experienced severe problems: low level of financial support from the state budget and industry, low salaries for scientists and engineers and de facto stagnation in RTD activity. The enterprise sector in Azerbaijan is still under-repre-
presented in RTD performance and there are only limited joint RTD initiatives between the public and the private sectors. Unfortunately, so far international RTD collaboration with Western countries is also limited. This raises needs at the level of intermediary organisations and there is still a need to develop and implement mechanisms supporting public-private research cooperations which aim at increasing the capabilities of both knowledge producers and knowledge users. Public initiatives have to be integrated into science policy to encourage public-private partnerships.

I.2.2 Current Trends & Challenges in International Cooperation

I.2.2.1 Bilateral Agreements
The State Agency on Standardisation, Metrology and Patents (SASMP) of Azerbaijan has so far joined eight conventions, agreements and contracts with the WIPO (World Intellectual Property Organisation) in the field of Industrial Property Protection. Among them are as follows:

2. Paris Convention for the Protection of Industrial Property
3. Patent Cooperation Treaty (PCT)
4. Madrid Agreement Concerning the International Registration of Marks
6. Locarno Agreement Establishing an International Classification for Industrial Designs
7. Strasbourg Agreement Concerning the International Patent Classification
8. Nice Agreement Concerning the International Classification of Goods and Services for the Purpose of the Registration of Marks. The SASMP is in the process of adopting European Patent Office (EPO) rules and principles, aiming at an association with the EPO

Azerbaijan joined the Eurasian Patent Convention in 1995. A multilateral cooperation with EPO has been successfully realised.

Bilateral agreements have been signed between Azerbaijan and some New Independent States of the Former Soviet Union.

Azerbaijan, like other Republics of the Former Soviet Union, benefits from several international research programmes and organisations: INTAS, US National Science Foundation’s CRDF programme, STCU, NATO’s Science for Peace, IAEA, etc. These programmes are actually assistance programmes focusing on research.

I.2.2.2 European Neighbourhood Policy
New prospects for a closer EU-Azerbaijan cooperation were opened after the inclusion of Azerbaijan in the European New Neighbourhood Policy (ENP) Initiative while the ENP Action Plan aims at contributing to sustainable economic development of the country. In the ENP Action Plan there is an article on the development of Azerbaijan’s capacity in technological R&D to support the economy and the society. In this article it is stated that the EU will help to develop a research and innovation policy directly relevant to the sustainable and equitable economic development policy objectives of Azerbaijan, including an appropriate programme of reforms in the scientific system and in the relevant regulatory framework. Amongst different elements of reform, steps will be taken to create a transparent and unbiased mechanism of competitive funding and management of scientific and technological research through inter alia open calls for proposals and an independent and high professional peer review evaluation process. It also contains an article stating the need for a closer integration of Azerbaijan into the European Research Area through a more active promotion of the participation of Azerbaijani research organisations in the EU’s Framework Programmes.

I.2.3 Challenges

I.2.3.1 Challenge 1: Elaboration of the State RTD and Innovation Strategy
From the entire complex of organisational and economic issues in the innovative development of the Azerbaijan economy, issues concerning the systematic development of the scientific and technological complex of the country are the most important ones. The implementation of such development is a “mission impossible” without elaborating the state RTD and the innovation strategy.

The development of the country’s sound and clear economic, scientific, and technical policy for a short- as well as a long-term outlook is imperative. The establishment of a full-scale innovative economy in which innovations related to the advanced processing
of natural resources will accompany all the stages of the reproduction process, from the creation of products and services demanded by society and the market, to the phase of completing effective life-cycles, is the main vehicle of social and economical development in the twenty-first century.

There are many problems which the present R&D organisation in Azerbaijan has failed to solve. The most serious problem is related to the fact that the quality of results obtained by Azeri researchers significantly lags behind world standards and has a weak link with Azerbaijan's socio-economic objectives (including the cooperation with businesses).

The Azeri RTD&I Strategy 2009-2015 should set objectives and measures to ensure the high quality and an increased intensity of Azeri research and development, to increase the business sector's innovativeness and the added value they create. The strategy and its implementation plan will provide the framework and the scope of the public sector with support measures until 2015, giving guidelines and motivation to research and development institutions and enterprises to plan and organise their activities in the long term. It could be said without exaggeration that the absence of a sound and clear strategy for the innovative development of Azerbaijan is a clear and present threat to the national security of the country.

The only policy measure that has addressed this challenge so far is the Presidential order to create a governmental commission for the implementation of reforms in the Azeri RTD, the elaboration of a National RTD Strategy for 2009-2015 and the design of an appropriate programme for its realisation on 10 April, 2008.

I.2.3.2 Challenge 2: Renewal of the Knowledge Base, including the Improvement of Research Quality and Capacity for Innovation

In order to develop a knowledge-based society and economy, Azerbaijan needs highly qualified and experienced researchers and engineers, who will ensure the sustainability and competitiveness of the public sector and the higher education system R&D, while at the same time they will ensure the quality of human resources for innovative entrepreneurship. Research and engineering careers must therefore be made more attractive to young people and experienced specialists, and measures must be taken to halt the brain drain, to guarantee that enough specialists receive doctoral degrees at universities and academic institutions, and to improve the possibilities for embarking on successful research careers.

Virtually isolated, the RTD system of Azerbaijan is fragmented, as its various components try to survive with a minimum of available resources, mainly by public funding, within mostly formal and autarchic systems.

Low salaries in the RTD system might be considered as a main reason for the lack of attraction, but in reality the reasons are more complex and are connected to the delayed institutional reforms, the poor quality of the research & development infrastructure, and the absence of an evaluation system fostering and rewarding excellence. One of the strongest reasons could be considered the absence of clarity and transparency concerning professional careers.

Furthermore, the funding level has had a negative impact on the maintenance and development of the research infrastructure needed for advanced research, for achieving valuable results at the international level and for solving complex problems of national interest in the economic and social fields. This negative impact has mainly affected international cooperation and the participation of international research projects and networks, generating isolation, disconnecting Azerbaijan from the main European research goals and reducing the access to new products and technologies which are necessary for the Azerbaijani industry and services. The lack of managerial ability and the absence of minimal institutional resources for supporting research laboratories have generated disfunctionalities even in places where a reasonably updated infrastructure existed.

The modest results and the weak international cooperation capacity are reflected in the low number of articles in mainstream scientific publications, and citations of the scientific results published by Azeri authors, but also in the lack of interest towards the protection of intellectual property. The extremely low number of patent applications by Azerbaijani authors, both domestically but particularly in Europe, the USA and Japan confirms this situation.

No specific policy measures from the governmental level have been identified that fully respond to this challenge. This refers to both direct and indirect measures.

However, several policy measures were undertaken which partly address this challenge.
I.2.3.3 Challenge 3: Increasing the Competitiveness of Traditional Industries by the Introduction of New Technologies

The latest research shows that 0.01% of Azerbaijan's enterprises have brought new or significantly improved products (goods/services) to the market or introduced new or significantly improved processes. In most of the enterprises the expenses on innovation are still used for the purchase of machines and equipment.

The majority of existing enterprises urgently need reconstruction and modernization in methods and technologies relevant to modern requirements and standards.

Azerbaijan’s economy has made very rapid progress in recent years, supported by domestic demand, foreign direct investments and increasing export.

However, even though Azerbaijan has been very successful in attracting foreign direct investment, most FDI has been made in sectors that are not particularly knowledge- and skill-intensive, but have instead lured foreign investors who are interested in the available natural resources and low labour costs which are in huge demand. Given that Azerbaijan is losing its competitive advantage due to the depletion of oil and gas reserves, it is crucial to create an attractive environment for knowledge intensive foreign direct investments.

The analysis shows that competitive (non-natural resource sectors) industrial sub-sectors exist in Azerbaijan. These sub-sectors are as follows:
1) the chemical and petrochemical industry;
2) the food industry (including beverages and tobacco);
3) the machine-building; and
4) light industry.

There is a serious challenge in continuing to attract direct foreign investments, which have played a vital role in economic growth. Unfortunately, as a rule, the FDI in Azerbaijan did not promote economic restructuring and technological modernization.

This challenge is addressed by a couple of specialised state programmes related to the development of some traditional industrial sectors and also by a number of state programmes that indirectly include issues and policy measures which may effect the traditional industrial development in the country. They are as follows: a long-term strategy to manage the oil and gas income in the Republic of Azerbaijan, a state programme on the development of a fuel-energy complex of the Republic of Azerbaijan (2005-2015), a state programme on poverty reduction and sustainable development in the Republic of Azerbaijan, a state programme on the development of SMEs, a state programme on the implementation of an employment strategy of the Republic of Azerbaijan (2007-2010) and the establishment of the “Azerbaijan Investment Company,” JSC.

I.2.3.4 Challenge 4: Promoting the creation of new high technology firms

The share of high-technology production in Azerbaijan is in comparison to other EU countries significantly lower. Approximately 3% of the output of the Azerbaijani industry is high-tech. The country's high technology primarily consists of the production of communication equipment and, to a smaller degree, the production of computers and scientific equipment. Due to the relatively high labour intensity and lower capital intensity, high-technology production is characterised by a relatively low added value compared to a medium high technology.

As in the second challenge, finding qualified labour has become a serious problem for high tech enterprises. The reason for this might be the fact that on the one hand, the Azerbaijani education system produces a relatively small number of graduates with a technical education and on the other hand, a relatively large number of Azeri researchers work in the academic sector.

Access to capital for start-up companies and companies with a great growth potential should be ensured. It is worrying that the country’s export market is not very knowledge or skill-intensive. This leads to a low productivity and low incomes for entrepreneurs. Therefore, a diversified government support for innovative start-ups, but also for more established companies that wish to move towards knowledge and skill-intensive activities, is extremely important as it leads to an increase in the added value created by companies.

Existing EIS data for Azerbaijan allows the creation of a summary innovation index (SII) – a composite index calculated using EIS data – along with as many as thirty countries that participate in the annual EIS survey.

The SII for Azerbaijan shows that it belongs to a group of so-called ‘laggards’. This terminology reflects the extremely low level of innovation activity. In order to understand this positioning and terminology, it is necessary to clarify a few conceptual issues.

SII, as a composite indicator, shows the extent to which growth in a country is based on innovation. SII does not necessarily relate to the economic growth of the country, especially not in the short-term, but it shows the degree to which economic growth embodies innovation. Growth can be also based on innovation factors like economic efficiency, which is not reflected in innovation but in production capability. Also, growth can be based on cheap and available labour or natural resources.

This latter factor is especially pertinent for Azerbaijan which is rich in natural resources. It is very difficult to initiate growth which is based on innovation since the economy is dominated by resource based sectors, and relative prices and economical rents favour these sectors.

However, we should bear in mind that the EIS indicators are somewhat skewed towards the measurement of international innovation activities – and consequently SII calculations as well - which are marginal in ‘laggards’ economies, as one would expect. An alternative composite indicator, which takes technology absorption much more into account as well as important technology acquisitions behind frontier innovation activities, would be a more appropriate reflection of technological activities in laggard countries.

Azerbaijan is clearly a laggard country in the sense that it is still faced with the challenge of building its innovation system. This is a task which may take a decade to implement but it is feasible for Azerbaijan to achieve. Being a resource-rich country, its main challenge is not a financial one but a politico-economic one: diversifying the economy towards technology intensive activities.

I.2.3.5 Further challenges
The lack of a clear RTD and innovation policy is responsible for the continuous marginalisation of research and development work and innovation activity in the country.

The main state body designing innovation activity in Azerbaijan is the Ministry of Economic Development. With the exception of this ministry, each ministry and the ANAS are charged with developing their own innovation policy. Besides the state bodies, joint-stock companies, private companies and large companies also develop their innovation policy, guided by their own business interests. Foreign experts are involved in the development of an innovation policy only in exceptional cases, as the additional financing that is required for this purpose is absent in the overwhelming majority of cases.

According to appraisals by independent experts, the quality of a decision-making process in the development of an innovation policy in Azerbaijan is low. Decisions are based neither on the careful analysis nor on the use of appraisal results or the use of indicators. There is no coordination between various departments interested in the realisation of any innovation programme or in the development of an innovation policy.
I.3 Country Report Belarus

I.3.1 Current State of S&T and Major Policy Challenges

I.3.1.1 S&T Indicators

TABLE 8: S&T LANDSCAPE (2009)

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.70</td>
<td>468</td>
<td>19,879</td>
</tr>
</tbody>
</table>

I.3.1.2 Research Structure and Policy

The legal basis in S&T and innovation policy is currently formed by 443 operating legal acts issued by the Parliament, the President, the Council of Ministers and the state bodies dealing with such issues. All these documents are available in Russian at the National Legal Internet-Portal. The list of the basic acts includes such laws as:

- The Law of 19.01.1993 No. 2105-XII “About the basics of the state science and technology policy”;
- The Law of 05.05.1998 No. 159-Z “About the National Academy of Sciences”;
- The Law of 05.05.1999 No. 250-Z “About scientific and technical information”;
- The Law of 17.05.2011 No. 262-Z “On the author’s right and related rights”,
- the Regulation of the Council of Ministers of 12.08.2010 No. 1326 “On selected issues of financing research, technology and innovation activities.”

The Programme of Social and Economic Development of the Republic of Belarus for 2011-2015 states innovations and an increase of investments to be a precondition of the country’s growth. By the end of 2015 Belarus has to reach the following indices: 20-21% of innovative industrial products shipped in total, 12-14% of innovative and high-tech products and services exported in total. The strategy of science, technology and innovation activities formulated in this document includes the following key tasks: developing an effective national innovation system, increasing innovative activities of companies and support to entrepreneurship and inventions. Their implementation will be based on:

- Technological modernization of key industries and production, introducing science-based technologies (such as information, nanoelectronic, optical, thin chemistry, biological technologies, etc.) for manufacturing products with high added value and low energy and material consumption, including products based on hydrogen technologies.
- Development of the material resources of the national science sector, as well as training highly qualified experts in the area of innovation activities.
- Increase of spending for R&D up to 2.5-2.9% of GDP and the share of non-budget funding up to 52-54% of total funding.

Within the last decade, the R&D system has undergone only a gradual change, with the relative shares of the three key sectors – higher education, business enterprise and government – remaining largely unchanged in terms of employment and funding. At the same time, R&D employment increased by 5% in 2003-2008. The share of gross expenditures on R&D in GDP remained stable at around 0.7% of GDP in the period 2001-2009. Government funding has remained roughly unchanged at around 0.35% of GDP. During that period, Belarus GDP rose very rapidly, so the stability of these shares is consistent with rapid


85 http://www.pravo.by/webnpa/webnpa.asp

increases in the amount of funding in nominal terms.\textsuperscript{87}

- The structure of the Belarusian R&D system by discipline is strongly dominated by technical sciences. This predominant position concerns most of the sources of funding. 78% of all R&D organisations in industry are in the machine-building sector whose own funds (61%) are larger than the budgetary funds (36%). This strong specialisation is an asset to exploit, provided that it generates increasing returns through clusters, spill-overs and knowledge exchange. Despite numerous efforts undertaken by the government to promote other disciplines that are reflected in the list of priorities, e.g. life sciences and biotechnologies which are increasingly important on a global scale, these remain relatively poorly represented.

- Improvement of IPR protection system and developing mechanisms to support inventors.

- Strengthening interconnections between science and business through the creation of new forms of enterprises capable of implementing the full cycle research – development – manufacturing – market sales, etc.

The following thematic priorities of S&T activities for 2011-2015 have been defined: energy and energy saving; agricultural industry technologies and production; industrial and construction technologies and production; medicine, medical equipment and technologies, pharmaceuticals; chemical technologies, nano- and biotechnologies; information and communication, aviation and space technologies; new materials; effective nature management, resource saving and protection from emergencies; defence and national security. These priorities are being realised throughout different types of programmes, as well as via international cooperation in science, technology and innovations.

The year 2010 and the beginning of 2011 were quite important for Belarus S&T policy making because of the need to assess the results of the activities within the previous budget cycle (2006-2010) and set up new priorities and programmes for the next five years. This process had been finalised by June 2011.

One of the key programmes under implementation is the State Programme for Innovative Development of the Republic of Belarus for 2011-2015.\textsuperscript{89} It contains a list of priority measures and projects, funding sources, executors and stakeholders with the overall goal to develop new and to upgrade existing manufactures based on technologies of the V and VI technological levels (ICT, airspace industry, pharmaceuticals, microbiology and biotechnology, nanoindustry, nuclear energy). According to the Programme, the shares of science-based and traditional products in Belarus should be comparable by 2015.

The list of programmes for 2011-2015 also includes twenty-eight state science and technology programmes and six regional ones\textsuperscript{90} (synchronised with the priorities of the S&T activities), as well as sixteen basic research and applied research programmes\textsuperscript{91}. These programmes are open to foreign partners (R&D centres, universities and companies) who participate by their own means.

Due to limited internal funding and lack of investments, Belarus R&D actors and the system as a whole are excessively oriented towards the commercialisation of R&D results, to the point that it could possibly undermines scientific excellence\textsuperscript{92}. The second wave of economic and financial crisis which affects the Belarusian economy in 2011-2012 has emphasized the need in innovations and investments more than ever.

\textbf{I.3.1.3 Important research organisations}

The Belarusian R&D system reflects the legacy of the Soviet past, as the business enterprise sector is not the major R&D performer, in contrast to what is typical in market economies. Only 12.8% of R&D personnel work in industrial enterprises. R&D is dominantly


Under the umbrella of NAS, eighty-six institutions have been linked with more than 30% of the total number of researchers and the largest share of highly qualified personnel (58% and 67% of candidates and doctors of science respectively of the republic’s total number). Besides R&D centres, the list of NAS’s institutions includes manufacturing companies and several science and production ones, such as the State Scientific and Production Amalgamation of Powder Metallurgy93. Another Belarus peculiarity is that NAS is not only a leading R&D organisation but it also coordinates basic and applied research, as well as appropriate state programmes thus partly playing the role of a ministry.

Involvement of universities in R&D activities is relatively low (8.2% of the total number of researchers, not including medical universities). The leading role belongs to the Belarusian State University94, the largest classic university in Belarus, as well as to the National Technical University95, the largest technical higher institution.

More than half of all R&D organisations (53%) are located in the extra-mural R&D sector. However, the R&D system is, in principle, largely oriented towards enterprises. It could be characterised as a system of R&D for, but not in the industry. This feature of the Belarusian system has remained its strong characteristic.

In line with the overall structure of the economy, R&D is mostly conducted by state owned institutions (74%) while private institutions, though growing in number, are not strongly represented at a national level.

I.3.2 Current Trends & Challenges in International Cooperation

I.3.2.1 National Policies

There is no specific policy document on international collaboration in science, technology and innovations. However, the key documents and programmes, e.g. the Programme of Social and Economic Development of the Republic of Belarus for 2011-2015, the State Programme of Innovative Development of the Republic of Belarus for 2011-2015, etc. emphasise the role it should play in supporting the implementation of priority projects of public value, promotion of domestic S&T products in the global market, training personnel and developing the national S&T potential, as well as in bringing investments into the national economy and science, including FDI, grants, loans, etc. And this is not just a declaration: international S&T cooperation has got a special line in the state budget and gets 3-4% of budget spending for R&D annually.

I.3.2.2 Bilateral Agreements, Regional Network / Cooperation

Following the principle “we cooperate with those who are willing to cooperate with us”, Belarus has got over 45 bi- and multilateral agreements at governmental level on cooperation in S&T or, more widely, on economic collaboration, of which S&T are integral parts. These agreements cover almost half of the EU member states (Bulgaria, Cyprus, Czech Republic, Denmark, Germany, Hungary, Italy, Latvia, Lithuania, Poland, Slovakia, Romania, and also the UK) and several associated countries (Israel, FYR of Macedonia, Turkey, Serbia), as well as the most important international organisations. Within the EU, Germany, France and the UK are among the top partners, followed by Austria, Italy, the Netherlands, Poland and Switzerland. In 2004, the first and so far only joint laboratory in Belarus was created with the support of ISTC: efforts of the Fraunhofer Society, Fraunhofer Institute for Nondestructive Testing (IZFP), Saarbruecken/Dresden, Germany, National Academy of Sciences of Belarus and its Institute of Physics have been united for joint R&D in optical diagnostics. The joint Fraunhofer-Stepanov laboratory is based in the B. Stepanov’s Institute of Physics, Minsk96.

In the EECA region, Belarus has got governmental agreements with Armenia, Kazakhstan, Moldova, Russia, Tajikistan and Ukraine. Historically, collaboration with Russia is characterised by the highest indices: 55% of NAS’s international projects are carried out with Russia (followed by Germany and China with 9% and 8% respectively97). In addition to numerous bilateral projects carried out using traditional schemes

93 http://pminstitute.by/eng/
94 http://bsu.by
95 http://bntu.by
96 http://ifanbel.bas-net.by
97 2010
(inter-ministerial bi-annual S&T programmes, joint calls for the foundation for basic research, inter-academic exchanges, etc.), there is an instrument called “programmes of the Union State of Belarus and Russia” funded from the joint budget. Since 1998, it has become one of the key instruments for supporting bilateral S&T cooperation with Russia in such areas as supercomputers, biotechnology, space, laser technologies, machinery building, etc.

Having no official links to the US, Canada and other industrialised economies, Belarus tries to diversify its collaborations and expands contacts with China, South Korea, India, the Mediterranean region, Latin America (Argentina, Venezuela) and Arabic countries.

Within the EECA region, Belarus is a member of two unions: Commonwealth of Independent States (CIS) and European-Asian Economic Cooperation (EurAsEC). At the moment, collaboration seems to be more active within EurAsEC which managed to launch the first S&T programme “Innovative Biotechnologies” initiated by Belarus. However, both CIS and EurAsEC lack mechanisms and instruments to support the initiatives in R&D sector so far.

The number of agreements and direct contracts at the institutional level is hard to estimate, as there is no source for such kind of information, while appropriations may give wrong results due to the different levels of international activity of institutions. Annually, around 450 international S&T projects are implemented in Belarus.98

I.3.2.3 European Neighbourhood Policy
Belarus, while covered by the European Neighbourhood Policy, does not participate fully in it. The principal objectives of the EU cooperation with Belarus defined in the Country Strategy Paper (2007-2013) are to support the needs of the population, to directly and indirectly support democratisation, and to mitigate the effects of the isolation of Belarus on its population. The National Indicative Programme for 2007-2011 translates these objectives into two priority areas: i) Social and economic development, including actions to alleviate the consequences of the Chernobyl catastrophe, and ii) Democratic development and good governance. For the period 2007-2011, a total of €46.07 million was allocated to Belarus.

I.3.2.4 Partnership and Cooperation Agreements (PCAs)
EU-Belarus PCA is not in force and that is the key barrier not only for developing official contacts but also for supporting initiatives at the national level aimed at developing cooperation with EU, e.g. national system of FP7 contact points, support for proposers, etc.

I.3.2.5 National and Bilateral Programmes
Bilateral cooperation in science and technology between Belarus and its partners within appropriate intergovernmental agreements is implemented through bi-annual programmes composed of joint R&D projects and scientific events. Each party funds its own participants. Belarusian partners of these projects are funded by the State Committee for Science and Technologies and/or Belarusian Republican Foundation for Fundamental Research. By 2011, Belarus had cooperation programmes with neighbouring Ukraine, Poland, Lithuania and Latvia, as well as with Moldova, Kazakhstan, Serbia, China, India and Venezuela. Since 1998, cooperation with Russia, the largest S&T partner of Belarus, has got a special instrument called “Programmes of the Union State of Belarus and Russia.” One of the most successful examples is the family of programmes for developing supercomputers – “SKIF” (2000-2004), “TRIADA” (2005-2008) and “SKIF-GRID” (2007-2010) – with its follow-up, “ORBIS” (2012-2015) which will result in developing the Belarusian-Russian infrastructure of supercomputer services.

I.3.2.6 EU Framework Programme for Research and Technological Development
The Belarus National Information Point for EU Framework Programmes was created in 2004 within the INTAS project. It works under the aegis of the State Committee for Science and Technology and is hosted by the Institute of System Analysis and Information Support of S&T Sphere.99 With the launch of FP7, the national NCP system has been developed more or less with a similar structure to EU member states. In 2011, it included ten thematic and five horizontal contacts based in different R&D centres and universities in Minsk. Belarus FP7 contacts are researchers and administrators. Not being supported by the national authorities as FP7 contacts, they put limited efforts to NCP activities. By June 2011, Belarus participated in 170 applica-

98 They are registered in the data base of international S&T projects monitored by the Belarusian Institute of System Analysis and Information Support of Scientific and Technical Sphere, www.belisa.org.by.
99 www.fp7-nip.org.by
tions that resulted in twenty-seven projects. The total EC contribution is approximately €1.1 million\textsuperscript{100}. The average success rate is 17%, however, it varies significantly from year to year and between themes. The most successful programmes are Information and Communication Technologies, Research Infrastructure and some schemes of the People Programme (International Research Staff Exchange Scheme).

I.3.2.7 European Neighbourhood Policy Instrument (ENPI)
ENPI enables Belarus to be a part of three cross-border cooperation programmes: Poland-Belarus-Ukraine, Lithuania-Latvia-Belarus and Baltic Sea Region. In general, ENP’s focus in Belarus gives limited room for S&T cooperation and few opportunities in innovations. Support to innovation in the field of natural and technical science (but also to selected non-technical services), linkage of innovation to SMEs, and transnational transfer of technology and knowledge is one of the priorities of the Baltic Sea Programme, within which five S&T-related projects are currently being implemented with a total budget for Belarusians of €620,000.

I.3.2.8 Lifelong Learning Programme (LLL)
TEMPUS, the oldest among LLL programmes in Belarus (since 1993), has resulted in four structural actions and also in twenty-four joint projects, of which two were supported in 2010. It plays a visible role in integrating Belarus higher education into the European universities’ network, as well as in the modernization of the national higher education institutes. The current national priorities in TEMPUS are focused on quality of education, academia-industry partnerships and international collaboration. However, TEMPUS remains one of the unsuccessful programmes that resulted in twenty-seven projects. The total EC contribution is approximately €1.1 million\textsuperscript{100}. The average success rate is 17%, however, it varies significantly from year to year and between themes. The most successful programmes are Information and Communication Technologies, Research Infrastructure and some schemes of the People Programme (International Research Staff Exchange Scheme).

ERASMUS MUNDUS is becoming more and more popular in Belarus, however it is still considered to be a new tool. In 2004-2011, thirty-nine master’s students and four Erasmus Mundus scholars were supported. Four scholarships were awarded for European Integration Studies at European Universities and eight scholarships for studies in the College of Europe. Belarus also participated in the Erasmus Mundus Action II/External Cooperation Window between 2007 and 2009 (€5.3 million, 48 months). The partnership of the two Belarusian universities – Belarusian State University (Minsk) and Brest State University – in the programme, gives their applicants more chances to be supported compared to those students who study in non-partner universities. For the latter, the success rate in the last call was extremely low (1:90).

I.3.3 Challenges

- Belarus has made important efforts in creating institutional relations with foreign partners but continued attention in this area is required. International mobility of Belarusian researchers and, in particular, young scientists is low. This hampers the creation of ‘a critical mass’ of internationally active researchers, as well as knowledge and best practices exchange and developing personal networks that may result in joint projects. The picture differs from area to area with a much better situation in ICT compared to, for example, life sciences, engineering and humanities. At the same time, permanent migration of scientists abroad may have negative implications for domestic scientific capabilities. Policies should recognise this potential downside and adopt measures that on balance increase the benefit of international mobility.
- The fact that international cooperation in Belarus is supported by the Government confirms the understanding of its value by the national authorities. However, the number of financial instruments for allocating public money is quite limited. The key instruments are:
  - funding the R&D of a Belarusian partner within a bilateral project which is included in a bilateral programme of cooperation in science and technology between Belarus and foreign countries;
  - co-funding the participation of R&D organisations in international S&T exhibitions in the country and abroad.

\textsuperscript{100}For the contracts concluded before October 2010.\textsuperscript{101}http://eacea.ec.europa.eu/tempus/participating_countries/impact/belarus.pdf\textsuperscript{102}The Ministry of Education regulates all university and faculty activities, using a license system as a tool to close private universities. All international contacts, including permission for studying or travelling abroad as well as permission to make use of an awarded TEMPUS grant, are also regulated by the Ministry of Higher Education. Although the initial adjustment of Belarus to the academic principles of the Bologna process was successful, in 2005 the country’s participation in the process was suspended because of the breach to fundamental principles of higher education, in particular the observance of the university’s autonomy and the development of the student self-management.
• Belarus should diversify its instruments for promoting international collaboration beyond the support for joint research. Such instruments could cover international publications and patents, proposal drafting, project-based mobility, networking, as well as information and consulting services aimed at promoting international cooperation, and also dedicated structures.

• In Belarus, the public support for a national network of FP contact points is lacking due to the absence of a legal basis of the Belarus-EU cooperation. However, Belarus is not unique: most of the Eastern European countries in which the dialogue with the EU is much more advanced do not fund their NCPs. Funding of NCPs’ daily activities is crucial for the increase of national participation in EU programmes. None of us are able to work for free for years. An intermediate decision could be to provide support to the national NCP networks through Eastern Partnerships.

• Effective international cooperation calls for wider participation of different actors. However, current support mechanisms are limited to state-owned R&D centres. Spreading them on science-based SMEs for which the barriers are the most significant could facilitate international collaboration in S&T and positively influence the whole economy.

• Belarus cannot participate in the US CRDF programme and Swiss SCOPES programme, which include other EECA countries. Germany, Poland, Switzerland and some other countries regulate the level of S&T bilateral collaboration with Belarus depending on the level of political cooperation. This means that withdrawn or reduced international support for S&T cooperation with Belarus decreases opportunities for R&D organisations, companies and individuals in the international arena. This calls for more intensive and sustainable activities of R&D players in order to promote globally their advantages and cooperation potential.
I.4 Country Report Georgia

I.4.1 Current State of S&T and Major Policy Challenges

Reforms in S&T being gradually implemented since 2004 have resulted in the adoption of new legislative acts and regulations; introduction of measures to stimulate cooperation between research, higher education and industry; establishment of the Georgia National Science Foundation with the main goal to allocate funds on a competitive basis and to develop diverse types of S&T supporting programmes (including joint activities with foreign counterpart organisations).

In order to develop an effective science policy, the EU supported project on “Creating an effective model of science administration: review of EU best practices and elaboration policy recommendations with the Ministry of Education and Science of Georgia” was implemented with the leadership of the Archimedes Foundation (Estonia) in 2006-2007. The project has developed a set of recommendations geared to the modernization of the country’s S&T landscape, an improvement of the Georgian legislative framework towards EU standards and the definition of a coherent S&T policy.

In 2010 Georgia proceeded with an optimisation of the S&T institutional structure focusing mainly on: (i) further harmonisation of research and HE and (ii) improvement of funding schemes and instruments in support of innovative S&T.

Around fifty research institutes have been integrated into the country’s main universities and thus nowadays research organisations in Georgia are represented by twenty-five universities, a Centre of Life Sciences and four research institutes of a technical profile.

Furthermore, in accordance with the Presidential Decree No. 428 of 16 June, 2010, Shota Rustaveli National Science Foundation (SRNSF) was established by merging two main funding entities: the Georgia National Science Foundation and the Rustaveli Foundation for Georgian Studies, Humanities and Social Sciences.

Nowadays, the following challenges can be considered as a major concern of Georgian S&T policy makers, researchers and other stakeholders:
1. Lack of cooperation between research and industry
2. Absence of institutional component (e.g. technological incubators) in support of commercialising research
3. Insufficiency of a coherent innovation policy
4. Reluctance of students to make an academic career, especially in hard sciences

I.4.1.1 S&T Indicators

The table below gives a general landscape of Georgia’s S&T in 2010 based on S&T indicators commonly used by the Ministry of Education and Science of Georgia (MES)

<table>
<thead>
<tr>
<th>S&amp;T Indicators of Georgia in 2010</th>
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<tbody>
<tr>
<td>R&amp;D expenditure as a % of GDP</td>
</tr>
<tr>
<td>Share of government expenditure on R&amp;D (%)</td>
</tr>
<tr>
<td>Share of HE expenditure on R&amp;D (%)</td>
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<tr>
<td>Share of business enterprise expenditure on R&amp;D (%)</td>
</tr>
<tr>
<td>Number of research organisations</td>
</tr>
<tr>
<td>Number of researchers (in public and private organisations)</td>
</tr>
<tr>
<td>Average researchers’ salary (in Euro)</td>
</tr>
<tr>
<td>Amount of scientific publications (according to ISI Database)</td>
</tr>
<tr>
<td>R&amp;D investment dedicated to international cooperation (in Euro)</td>
</tr>
<tr>
<td>Percentage of researchers involved in programmes/projects of international cooperation</td>
</tr>
</tbody>
</table>

103 Source: MES and SRNSF
I.4.1.2 Research Structure and Policy

Legal basis for national S&T policy: The S&T activities in Georgia are regulated by two main legal acts: “Law on Science and Technologies and their Development,” and “Law of Georgia on Higher Education.” Furthermore, “Law on National Academy of Sciences” highlights the scope of the Academy’s activities. Georgia is a party to all the main international agreements concerning IPR and thus the legislative base of intellectual property protection comprises of most of the elements necessary for its functioning. Allocation of funds in S&T from the state budget, including funding schemes of competitive granting, is regulated by governmental decrees.

General priorities of S&T policy: General priorities of Georgia’s S&T policy can be represented as follows: (i) Building up a knowledge base for the economy; (ii) Developing research infrastructure; (iii) Supporting young talented scientists; (iv) Facilitating international cooperation and (v) Popularisation of science.

Main S&T fields: Currently the main thematic priorities identified by the Ministry of Education and Science of Georgia are as follows: (i) Georgian Studies; (ii) Engineering Sciences and High-tech Materials; (iii) Information Technologies and Telecommunications.

I.4.1.3 Important Research Organisations

Ministry of Education and Science of Georgia: The S&T policy of Georgia at a governmental level is developed by the Ministry of Education and Science. Besides, the Ministry coordinates the main financial stream lines for S&T from the state budget.

SRNSF: In close coordination with the Ministry, the SRNSF develops S&T strategy mainly through the development of national programmes and identification of thematic priorities for cooperation with foreign partner organisations. In the scope of the national programmes, the SRNSF allocates funds to groups of Georgian researchers and individual scientists by providing competitive grants.

National Academy of Sciences: Involvement of the National Academy of Sciences in S&T policy is outlined by advising the government and identifying the country’s priorities in science.

Universities: By developing their intramural S&T policy and strategy, the main Georgian universities (such as: the Ivane Javakhishvili Tbilisi State University, the Ilia State University, the Georgian Technical University, the Tbilisi State Medical University and the Agrarian University) have a tangible influence on the country’s S&T policy, especially after around fifty research institutes were integrated into the university structure in 2010. The leadership of the main universities is involved in the decision making process at local and national levels by participating in the activities of various working groups, councils, ad hoc committees, etc. For example, the quota of universities in the Science Board of SRNSF (the decision making body of the main funding institution of Georgia) is around 30%.

Private sector: Involvement of private and non-governmental organisations (e.g. the Georgian Research and Development Foundation – GRDF) in S&T policy is relatively small and differs from case to case.

I.4.2 Current Trends and Challenges in International Cooperation

I.4.2.1 National Policies

International cooperation is considered a priority in the Georgian S&T and this is included into the “Law on Science and Technologies and their Development.” Participation in international R&D programmes establishes a long-term fruitful cooperation with foreign colleagues, and provides a tangible financial support to Georgian researchers (around $70 million).

The main funding sources are listed as follows:

- NATO SPS – around 150 projects with an overall budget of $10.5 million
- CRDF – around 170 projects with an overall budget of $7.5 million
- ISTC – around 150 projects with an overall budget of $29.5 million
- STCU – around 100 projects with an overall budget of $10.0 million
- EU FP7 – around 30 projects with an overall budget (for Georgian participants) of $3.0 million
- INTAS (before 2007) – around 220 projects with an overall budget of more than $6.5 million

ANNEX – Country Report Georgia
I.4.2.2 Bilateral Agreements
Support of the international S&T cooperation is an integral part of all agreements on cooperation concluded by the Georgian Government with its foreign counterparts. SRNSF (before 2010 it was GNSF), as one of the main S&T policy making and funding entities, has signed a number of bilateral agreements with international/national S&T organisations. In particular these are:

- “Statement on Intent to Cooperate” with Science and Technology Centre in Ukraine (STCU), 2006;
- “Agreement on Scientific Cooperation” with U.S. Civilian Research and Development Foundation (CRDF), 2006;
- “Protocol on Scientific Cooperation” with French Centre National de la Recherche Scientifique (CNRS), 2008;
- “Agreement on Scientific Cooperation” with National Research Council of Italy (CNR), 2010.

An agreement on scientific cooperation between the SRNSF and the TUBITAK (Turkey) is being prepared and a revival of the “Agreement between the Government of the Hellenic Republic and the Government of the Republic of Georgia on Cooperation in the fields of Education, Science and Culture” (signed in Athens in 1994) is on the agenda.

I.4.2.3 Regional Network / Cooperation
Apart from the countries mentioned above, Germany, Finland and Estonia can be considered as the main collaboration partners of Georgia in S&T. Georgian researchers are involved in German programmes open to third countries (e.g. IEBC and diverse instruments of the DAAD). The EU funded project “Creating an Effective Model of Science Administration” implemented in 2006-2007 by the Archimedes Foundation (Estonia) with the participation of Finnish experts introduced EU best practices in R&D management and provided recommendations to the Government of Georgia for the development of a coherent S&T policy. Georgia benefits from opportunities offered by other European countries (e.g. Swiss R&D programme SCOPES) and takes part in European wide programmes such as ATLAS implemented by the European Organisation for Nuclear Research (CERN). Since 2007 Georgia provides an annual contribution to CERN.

As a participant of the European and international S&T programmes and projects, Georgia is involved in different S&T networks such as: GEANT and Idealist – in ICT, EECAlink – in health, IncoNet EECA and IncoNet CA/SC – in S&T policy, BS-ERA.NET – networking of S&T funding agencies of the Black Sea region, etc.

Many Georgian universities benefit from the membership of professional networks and associations practically in all fields of S&T. The universities collaborate with foreign partners by conducting joint programmes (e.g. exchange of PhD students) and research projects on the basis of cooperation agreements.

I.4.2.4 Partnership and Cooperation Agreement (PCA)
Partnership and cooperation agreements between the EU and Georgia came into force on 1 July, 1999 (Official Journal OJ L 205 of 4.8.1999). Title VI, Article 53 “Cooperation in Science and Technology” of the document declares the following:

1. The Parties shall promote cooperation in civil scientific research and technological development (RTD) on the basis of mutual benefit and, taking into account the availability of resources, adequate access to their respective programmes and subject to appropriate levels of effective protection of intellectual, industrial and commercial property rights (IPR).

2. Science and technology cooperation shall cover: (i) the exchange of scientific and technical information; (ii) joint RTD activities; (iii) training activities and mobility programmes for scientists, researchers and technicians engaged in RTD on both sides. The Parties, on the basis of mutual agreement, can engage in other forms of cooperation in science and technology.

3. In carrying out such cooperation activities, special attention shall be devoted to the redeployment of scientists, engineers, researchers and technicians which are or have been engaged in research and/or production of weapons of mass destruction.

4. The cooperation covered by this Article shall be implemented according to specific arrangements to be negotiated and concluded in accordance with the procedures adopted by each Party, and which shall set out, inter alia, appropriate IPR provisions.

I.4.2.5 National and Bilateral Programmes
Georgia is involved in the S&T strategy dialogue participating in the activities of regional organisations such as BSEC, GUAM, BSREC, etc. Furthermore, the country is a partner of the Black Sea Basin Joint Operational programme (BS JOP) and BS Cross Border Cooperation in which around ten BS region countries are involved.
In 2010 SRNSF earmarked more than €10 million for the implementation of the following national programmes:

- The State Grants for Fundamental and Applied Studies;
- Presidential Grants for Young Scientists;
- Grants for Outgoing Internship of Young Scientists;
- Grants for Research Infrastructure;
- Short-term Individual Travel Grants;
- Grants for the Organisation of Conferences;

The programme “The State Grants for Fundamental and Applied Studies” is open for participation by foreign researchers in the format of joint projects, yet the grants are provided only to Georgian participants. The following S&T bilateral programmes are implemented in cooperation with foreign partner organisations:

- “Targeted R&D Initiatives Programme,” partner STCU, thematic priorities: a) Biotechnologies and Life Sciences b) New Materials c) Information and Communication Technologies;
- Programme “International Research Groups,” partner CNRS, thematic priority: Geosciences;
- “International Exchange Programme,” partner CNR, all thematic priorities.

Several programmes are implemented by GRDF (through the financial contribution of CRDF) in support of: (i) research targeted on the social and economic national concerns of Georgia; (ii) young scientists and engineers; (iii) business oriented scientists, (iv) civilian research implemented by former weapon scientists to provide an alternative to their emigration from Georgia. In addition, GRDF administers four mega projects funded by the USA under the Cooperative Biological Research Programme (CBR).

I.4.2.6 EU Framework Programme for Research and Technological Development

The Network of FP7 NCPs in Georgia is represented by coordinating NCP (operating at SRNSF), NCP of the programme “People” and five thematic NCPs: health, food, ICT, nano-sciences and environment. Information support for researchers either at the institutional level or for targeted/thematic groups is provided by e-mail and the FP7 national webpage as well as by a periodical organisation of info days at the main scientific centres. Group and individual consultations are provided regularly.

By the end of 2010, the number of project proposals with the participation of Georgian researchers/experts submitted to various calls of FP7 was over 130, while twenty-six projects (with the participation of thirty-seven Georgian organisations) were granted with a total EC contribution of almost €3 million.

I.4.2.7 European Neighbourhood Policy Instrument (ENPI)

In brief, the item 4.6.5 of “ENP Action Plan for Georgia” declares the following S&T fields as priorities:

(i) Reinforce human, material and institutional resources to improve the capacities in technological R&I;
(ii) Restructure of the science management system
(iii) Prepare Georgia’s integration into ERA and implement an appropriate information strategy to facilitate the adequate participation of Georgian scientists in the Community FPs.
(iv) Reinforce Georgian participation in international Marie Curie fellowships.

In 2010 contributions to all types of projects implemented in Georgia within the frame of ENPI totalled around €27 million.

In the frame of ENPI, especially under the twinning instrument, the Ministry of Education and Science of Georgia implements in cooperation with European partners the project “Capacity Enhancement for Implementing the Bologna Action Lines in Georgia” (CEIBAL). The overall objective of the project is to fully implement the Bologna process action lines within the relevant institutions and to prepare them for the integration into the European Higher Education Area (EHEA).

In 2010 a number of projects with the participation of Georgia were funded in the frame of various European programmes. In particular: TEMPUS programme has provided grants to eight Georgian universities under the instruments: Joint European Project – JEP (ten projects) and Structural Measures – SM (two projects).
Lifelong Learning Programme (Jean Monnet Programme, Key Activity 1) granted the project “Improvement of the European Innovation Policy Study in Georgia.” (Beneficiary/Contractor – ESIDG). Further education reforms including higher and secondary vocational education and training were announced. Thanks to Erasmus Mundus grants, sixty-three Georgian students and academics were able to pursue studies in EU universities.

Marie Curie Fellowships are represented by:
- Incoming international fellowship (IIF), GE fellow visiting IT for 1.5 years then returning to GE, physicist;
- Transfer of knowledge projects (TOK) with Poland (two projects) research in both directions: physics and mathematics;
- GE fellow recruited by BE training network, physics; GE fellow recruited by EL training network: physics.

1.4.3 Challenges

The major challenges Georgia faces currently in international cooperation are as follows:
1. Insufficient awareness/utilisation of the best European and international practice for the development of a coherent national S&T policy and strategy.
2. Lack of expertise of local S&T stakeholders (including policy makers) of the ‘rules of the game’ in S&T at European and international levels.
3. Insufficient direct/bilateral and sustainable cooperation of Georgian researchers and engineers with their foreign colleagues.
4. Need of effective funding instruments geared to the encouragement of international cooperation at institutional and individual levels (e.g. financial support of bottom-up initiatives, exchange of researchers, and internship of young promising scientists in partner countries).
I.5 Country Report Kazakhstan

I.5.1 Current State of S&T and Major Policy Challenges

I.5.1.1 S&T Indicators
The main paper which determines S&T indicators is the Order of the Government of the Republic of Kazakhstan No. 1291, “About the approval of inter-branch programmes for research and technology development of the country until 2020” adapted on 30th November, 2010.

The document states that currently most R&D projects are implemented in the agrarian sector (3,040), followed by metallurgy (790), and the oil and gas sector (79). Analyses of R&D indices of the thematic priorities show that the agrarian sector (sixty-four or 18%) and metallurgy (thirty-five or 6%) included the largest number of projects. Still, the number of R&D projects, which are about to be implemented in industry, is very low. There are 165 R&D proposals recommended for industrial application in the field of the oil and gas industry, the mining complex, the coal industry, the agrarian and energy complex, the pharmaceutical, chemical and petrochemical industry, and biotechnology and medicine.

In general, there is still some disproportion between research, development, design and production, because 45.1% of all research institutions are aimed at basic research, and only 6.4% of the total number of institutions are R&D oriented.

I.5.1.2 Research Structure and Policy
The state scientific and technical policy of the Republic of Kazakhstan in the long and intermediate term perspective is oriented in solving major national problems: providing the country with foodstuffs, materials, energy, guarantee of national safety, increase of the quality of public health services, preservation of the environment, stimulation of employment, development of transport and communication, increase of the competitiveness of the economy on the basis of the development and application of advanced technologies in the leading branches of science.

Since June 2007 the country has implemented the State Programme on Science Development in Kazakhstan for 2007-2012105. The aim of the programme is to achieve a competitive and balanced system of science providing a high level of knowledge relevant to the sustainable socio-economic development of the country. The main goals of the research system included in the programme are the modernization of the RTD management system and the RTD infrastructure, as well as its legal background and the increasing governmental financial support for RTD.

In 2010 the Government of Kazakhstan adopted a new state programme for accelerated industrial-innovative development for 2010-2014106, designed in accordance with the key areas of the Strategic Plan of Development of Kazakhstan until 2020, which is the second stage of the Kazakhstan Development Strategy up to 2030. The programme aims to ensure sustainable and balanced economic growth through diversification and an increased competitiveness. In 2015, the main priority of the rapid industrialisation will be the implementation of major investment projects in the traditional export oriented sectors, with the creation of new business opportunities for small and medium-sized businesses through targeted development, the subsequent redistribution and recycling.

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104 According to the Agency on Statistics of the Republic of Kazakhstan (2011, www.stat.kz), the total number of personnel engaged in R&D are 17,021 people.
106 Presidential Decree, Republic of Kazakhstan No. 958 March 19, 2010
Systematic measures of the economic policy will focus on the formation of a favourable macro environment and an investment climate, but also on measures to improve productivity and the competitiveness of the national economy.

The context of the research policy in Kazakhstan for the period 2007-2012 is divided into the following two stages: 1st stage: the institutional modernization, 2007-2009 and 2nd stage: a sustainable development, 2010-2012.

The most important issues of the first stage of the institutional modernization are: achievement of best results in the unified coordination and management of the scientific-research programme; identification of real scientific research priorities; balanced funding of research by public and private sectors through calls for proposals and tenders; re-orientation of research to competitive products on the scientific market; and increase of the role of RTD along with increasing the international scientific cooperation in line with approximately twenty more tasks listed in the Governmental Programme. This stage also includes specific activities to increase knowledge and skills of the scientific staff, to bring the Kazakh research closer to international standards via the identification of national scientific and technological indicators and support the research and technology transfer.

The second stage foresees a number of activities towards the inclusion of Kazakhstan to the fifty most competitive countries of the world according to the index of knowledge used in economics. These activities will include, along with the implementation of international RTD standards on the scientific market; and increase of the role of RTD along with increasing the international scientific cooperation in line with approximately twenty more tasks listed in the Governmental Programme. This stage also includes specific activities to increase knowledge and skills of the scientific staff, to bring the Kazakh research closer to international standards via the identification of national scientific and technological indicators and support the research and technology transfer.

The most important issues of this stage are the increase of technology development by domestic companies by 50%, and finally, the increase of GDP up to 50% by a ratio of RTD structure of GDP by 2012.

Since the end of 2010 the Kazakh Government has adopted the State Programme for the accelerated industrial-innovative development of Kazakhstan for 2010-2014, which identified key policy priorities for forced industrialisation. The main content of the programme is a tool to implement large investment projects in the traditional export sectors, with the creation of new business opportunities for small and medium-sized businesses through the purposeful development of local contents, and the subsequent redistribution and recycling.

In February 2011, Kazakhstan adopted a new law “On Science”107 designed to regulate relations in the field of science and scientific and technological activities, the definition of basic principles and mechanisms of functioning, and the development of the national scientific system. It has the following main components:

- Involvement of leading researchers into the decision making process in research, technology and innovation development to identify the research and technology priorities of the country by the creation of national scientific councils and expert groups in certain priority fields. These councils and groups will be responsible for the national review of RTDI, and will develop analyses and reports in order to identify relevant funding for research, technology and innovation.
- Acceleration of innovative development to implement research results into the modern economic and social system by creating an uninterrupted cycle of education, science and industry.

The new law “On Science” identifies new research funding tools, such as grants for basic research and industry targeted activity. The public research institutions and universities have the right to use resources from grants to improve their scientific infrastructures and utilities, and to cover information and communication, staff expenses and specific research needs. Funding can be provided based on calls for proposals and tenders.

I.5.1.3 Research Policy: Objectives and Priorities

The main branches of the Kazakh economy are oil-and-gas, mining-metallurgical complexes, and agriculture. Therefore scientific and technology programmes should first of all supply the development of these branches, including the programmes on petrochemistry.

In 2002 the government of Kazakhstan, taking into account the needs of the socio-economic development of the country and trends in the development

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107 Presidential Decree, Republic of Kazakhstan No. 407-IV, February 18, 2011
of global science, adopted five priorities for research, which are still current, and will not be changed until 2012. They are clearly described in the previous country report.

The State developed long and medium term scientific and technical programmes to encourage national research in studying the most important issues of food maintenance for the country; material providing; energy; national security; quality of the health care system; employment; transport and communications development; competitiveness of the economic system.

The main research stakeholder of Kazakhstan is the High Scientific Technology Committee (HSTC) headed by the Prime Minister of Kazakhstan. The Committee includes all ministries of Kazakhstan, which are responsible for research development in certain priority fields. Any decision of the committee has to be approved by Parliament.

The Government of Kazakhstan is going to increase public spending on science and innovation to 1% of GDP by 2015, of which 60% will be spent for research and technology projects. Today, science funding is equal to 0.16% of GDP.

Current S&T funding is shown in the table below and includes the following figures:

- 59.0% – means of the state budget
- 16.5% – means of regional budgets
- 0.3% – means of institutes of development
- 22.4% – private budgets
- 1.2% – other incomes
- 0.6% – means of foreign investors

### I.5.1.4 Important Research Organisations

The S&T development in Kazakhstan is coordinated by the Ministry of Industry and New Technologies and by the Ministry of Education and Science.

The State Statistic Agency of Kazakhstan has registered 424 research organisations engaged in S&T development. Among them are, in accordance with the Government Programme on scientific development for the Republic of Kazakhstan 2007-2012, five national scientific laboratories which were created for shared use, fifteen laboratories of engineer profile[^108] and forty-one research entities included into the system of the Ministry of Education and Science. The remaining research institutions belong to different ministries of Kazakhstan such as the Ministry of Industry and New Technologies, the Ministry of Health, the Ministry of Agriculture, the Ministry of Oil and Gas, the Ministry of Environment, etc.

The structure of the Ministry of Education and Science includes 132 national universities in Kazakhstan[^109], of which twenty-two are involved in S&T.

An analysis of the participation of the Kazakh SMEs at FP7 calls shows that 23.53% of total KZ grant holders are SMEs. The main financing institutions of Kazakhstan, which provides venture capitals for SME in R&D, are the National Innovation Fund and the National Fund to Support SMEs.

In general, the distribution structure of organisations engaged in S&T fields is as follows:

- Private non-commercial sector: 23.6%
- Business sector: 25.5%
- Sector of high education: 28.5%
- State sector: 22.4%[^110]

### I.5.2 Current Trends & Challenges in International Cooperation

#### I.5.2.1 National Policies

The national programme “Kazakhstan-2020” aims to develop an innovative economy and identifies five positive trends in the Kazakh economy:[^111]

1. Energy efficiency
2. Growth of non-raw material sector
3. Agro-industrial complex
4. Support of SMEs
5. Growth in labour productivity

The Government of Kazakhstan recognised that enhancing and strengthening international cooperation will play a very important role in achieving these goals. International cooperation in research, science and technology is regulated by the Law of Kazakhstan “On Science” chapter 7, article 29. The cooperation is based on international agreements and contracts. There are more than 140 agreements and contracts with different countries on research cooperation. It is necessary to note that any international grant agree-

[^108]: http://www.scedu.kz/ru/nauchnye_laboratorii/
[^109]: www.edu.gov.kz
[^110]: According to the Kazakhstan Agency for Statistics. www.stat.kz
[^111]: Presidential speech, Republic of Kazakhstan, July 4, 2011.
ment in Kazakhstan is free from any local taxes and duties, with the exception of individual incomes in accordance to the Tax Code of Kazakhstan.

Article 29 of Chapter 7 of the Law “On Science” of the Republic of Kazakhstan accepted on 18 February, 2011 states the following:

1. International cooperation is based on relevant international treaties, international scientific, technical projects and programmes, as well as on promoting the establishment and expansion of scientific and technical cooperation between Kazakhstan and foreign scientific organisations or others.

2. The subjects of scientific and (or) scientific and technical activities shall have the right to join international scientific, technical organisations and associations, to participate in international academic, scientific and technical projects and programmes of scientific, technical projects and programmes in foreign countries.

3. On the territory of the Republic of Kazakhstan scientific organisations and research centres can be created in the established order, with the participation of foreigners, stateless persons and foreign legal entities.

4. Foreign investments in science and technology are made in a manner and form prescribed by the laws of the Republic of Kazakhstan.

5. The state authorities of Kazakhstan have control over the transfer of scientific and (or) scientific and technical results, as well as scientific and (or) scientific and technical products from the territory of the Republic of Kazakhstan in accordance with the laws of the Republic of Kazakhstan.

The new law on science foresees participation of foreign researchers in national calls for proposals. Participation of scientists in different activities of the Kazakh research mainly includes scientists from EECA. Scientists from other foreign countries participate in the projects based on bilateral and multilateral agreements.

Still, Kazakhstan has neither bi- nor multilateral or joint calls for proposals or tenders launched together with the EU with the exception of joint calls with INTAS launched in 1996 and 1997. These valuable opportunities for the Kazakh researchers are under the consideration of the Government.

The Government of Kazakhstan has adopted a number of laws concerning the IPR based on section V of the Civil Code of the Republic of Kazakhstan “Intellectual Property Rights”:

- “About copyrights and allied rights”
- “The Patent Law”
- “About trade marks, service marks and designations of places, from which production originate”
- “About breeding achievements”
- “About topology of integral micro schemes”

On 9 June, 2011 the Kazakh Parliament ratified an agreement of the Customs Union (Russia, Kazakhstan, and Belarus) on unified principles of the IPR protection.

Chapter 3 of the Law of the RK about Science foresees four articles concerning the IPR:

- Article 11, Subject of the IPR
- Article 12, Subject of the scientific IPR
- Article 13, Right of authorship for results of research and scientific-technological activities
- Article 14, Non-property and property rights of persons regarding the results of research and/or scientific-technological activities

International research projects in Kazakhstan are free from any taxation in accordance to the Tax Code of the RK. There are no duties on the import of scientific equipment in accordance with the Tax Law of the RK.

I.5.2.2 Bilateral Agreements

Cooperation with EECA Countries

A number of bilateral cooperation agreements have been concluded between Kazakhstan and the EECA countries, such as Azerbaijan, Belarus, Kyrgyzstan, Russia, Turkmenistan, Ukraine, and Uzbekistan in different fields of education and science: seismology, metallurgy, oil, gas, economy, linguistic, exchange of students and teachers, recognition of high school diploma between the countries and others. The most important of them are:

- Kazakhstan - Russia cooperation agreement in the humanitarian sphere for 2007-2010 signed on 4 October, 2007 in Novosibirsk, Russia
- Kazakhstan - Russia cooperation agreement on cooperation in culture, science and education signed on 28 March, 1994
- Kazakhstan - Russia cooperation agreement on science and technology development signed on 25 November, 1996
- Kazakhstan - Belarus cooperation agreement in the field of higher and postgraduate education, which came into force on 29 October, 2009
• Kazakhstan - Ukraine cooperation agreement on education and science signed on 14 September, 2010
• Kazakhstan - Tajikistan cooperation agreement on higher education signed on 30 May, 2008

Cooperation with EU-member States and Associated Countries
Kazakhstan has concluded bilateral cooperation agreements with Bulgaria, Germany, Greece, France, Poland, Spain, Turkey, and the UK. All of these agreements allow for joint research, exchange of students and teachers, creation of equal conditions for students and tutors, as well as the joint participation within the EU Framework Programmes, and activities included into DCI, LLL, and ENP instruments.

Within this group of countries Kazakhstan traditionally cooperates closely with Germany. Based on the bilateral agreement between the countries, institutions of Kazakhstan will participate in activities of the GTZ, the BBZ, and the DAAD.

Since its independence, Kazakhstan has established a close cooperation with the UK, especially in the field of RTD. About 45% of the projects funded by the EU-FP are coordinated by UK institutions.

DCI is a programme supported by the EU Delegation in Kazakhstan and well known within the country thanks to its previous activity under TACIS projects. The DCI projects are mainly for social and political issues, and thus do not include special parts for research and scientific tasks, but they do include some research data.

At the DCI Workshop organised by InExCB-Kz under INCONET-EECA on 25-26 March, 2010 in Almaty, it was decided to allow research institutions to participate in DCI projects. The last DCI calls show that there is still no specific research activity.

TABLE 11: LIST OF BILATERAL AGREEMENTS BETWEEN THE EU MS AND AC AND THE REPUBLIC OF KAZAKHSTAN

<table>
<thead>
<tr>
<th>Country</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>The regulation of the Kazakh-Bulgarian intergovernmental commission on trade-economic and scientific-technical cooperation. Sofia, 13.3.98. Entered into force March 13, 1998</td>
</tr>
<tr>
<td>7</td>
<td>Agreement between the Government of the Republic of Kazakhstan and the Government of the Federal Republic of Germany for further cooperation for the development of Kazakh-German, University in Almaty, Astana, 03.09.08. Entered into force on August 20, 2010</td>
</tr>
<tr>
<td>9 Denmark</td>
<td>Protocol on establishing diplomatic relations between the Government of the Republic of Kazakhstan and the Government of the Kingdom of Denmark. Almaty, 05.07.92. Entered into force upon signature</td>
</tr>
<tr>
<td></td>
<td>Country</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
</tr>
<tr>
<td>10</td>
<td>Spain</td>
</tr>
<tr>
<td>12</td>
<td>Cyprus</td>
</tr>
<tr>
<td>16</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>17</td>
<td>Norway</td>
</tr>
<tr>
<td>18</td>
<td>Poland</td>
</tr>
<tr>
<td>20</td>
<td>Romania</td>
</tr>
<tr>
<td>28</td>
<td>Sweden</td>
</tr>
</tbody>
</table>
The EU and Central Asia: Strategy for a New Partnership

The EU has strengthened its relationship with the Central Asian countries since the adoption of “The EU and Central Asia: Strategy for a New Partnership” by the European Council in June 2007 (Central Asian countries: Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan). The strategy strengthens relations in all areas of cooperation including the reinforcement of EU-Central Asia political dialogue with regular meetings of the EU and Central Asian Foreign Ministers, the reinforcement of dialogues on human rights, the cooperation in the areas of education, rule of law, energy and transport, environment and water, common threats and challenges (including border management and combating drug trafficking), and trade and economic relations. The strategy is supported by a significant increase in EU assistance.

The main directions of cooperation between the European Union and the Republic of Kazakhstan in the field of education are described in the “EU Strategy for Central Asia: Updated priorities for Kazakhstan” for 2007-2013. They include the development of cooperation between the leading universities and partners in the European Union (student exchange and scholarship) and the development of professional-technical education (participation in the programmes of the European Training Foundation).

Partnership and Cooperation Agreements (PCAs)

The Partnership and Cooperation Agreement (PCA) with Kazakhstan has been the legal framework for EU-Kazakhstan bilateral relations since it entered into force on 1 July, 1999. In November 2006 a Memorandum of Understanding on cooperation in the field of energy between the EU and Kazakhstan was signed establishing the basis for enhanced cooperation.

The European Commission’s future assistance will focus on the following priority areas: promotion of the ongoing reform process at political, economic, judiciary and social level, infrastructure building, and cooperation in the energy sector.

In the last decade, developing good relations with Kazakhstan has become an ever more important priority for the European Union - driven by Kazakhstan’s growth as a reliable energy supplier and the country’s rising profile on the international scene.

Negotiations on a new agreement regarding enhanced partnership and cooperation between Kazakhstan and the European Commission were launched in Brussels on 26 June, 2011 during the 12th session of the Cooperation Committee “Kazakhstan - European Union.” This document, which will replace the current agreement signed in 1999, will move forward the Kazakh-EU bilateral interaction and will include unexplored areas of cooperation.

His Excellency Mr. Norbert Jousten, Ambassador, Head of the EU Delegation in Kazakhstan, in his recently published article “Kazakhstan – European Union: Strategy of Partnership” clearly describes the strengthening of the cooperation between the EU and Kazakhstan:

“Research and innovation are key elements for an industrial modernization programme. In this area we also have ongoing cooperation through the European Union’s chief instrument for funding research, the Seventh Framework Programme for research and technological development (FP7). We consider that the current level of Kazakh involvement in FP7 is below its potential, but we appreciate the signs showing that interest is increasing. As Kazakhstan is an International Cooperation Partner Country, all Kazakh research entities are eligible for funding by the European Union for their participation in projects, and so enjoy the same rights and obligations as those entities established in the EU Member States.

EU grant assistance to Kazakhstan has played an important role since 1991 in the support of Kazakhstan’s development and in support of EU-Kazakhstan relations. Since the country’s independence, more than 300 projects amounting to €140 million have been funded. The biggest share of these funds has been and continues to be allocated to policy advice and technical assistance as well as in support of people-to-people contacts.

Currently, more than fifty EU-funded projects address important topics in six broad priority sectors defined by the “EU Central Asia Strategy for a New Partnership”: 1. Human rights, rule of law, good governance and democratisation; 2. Investing in the future: youth and education; 3. Promotion of social and economic development, trade and investment; 4. Strengthening energy and transport links; 5. Environmental sustainability and water; 6. Combating common threats and challenges. In all of these areas, the EU has established close cooperation links with national authorities, private sector and civil society. Some of the projects are regional projects involving
other Central Asian countries. Technical assistance in the energy sector is provided at the regional level under the Baku Initiative within the framework of the INOGATE programme on the convergence of energy markets, energy security and investment attraction. An important aspect of the cooperation is the enhancement of environmental protection in the oil and gas industries through an improved legislative and regulatory framework.

Other ecological challenges are focused as well through the EU-Central Asia Environmental Dialogue and subsequent concrete actions, especially in the field of climate change mitigation and the integrated water resources management. The main operational activities in the area of education include the Erasmus Mundus academic mobility programme, the TEMPUS programme on modernization of higher education, support programmes of vocational education and research institutions.

In terms of specific goals for our grant based national cooperation, the Government of Kazakhstan and the EU agreed to focus in the coming years on local development, the reform of public administration and the reform of the judiciary system to support the rule of law in the country. This reflects our common understanding that no long-term economic prosperity is possible without a transparent and effective political and administrative system, the rule of law and an independent and competent judiciary. At the same time, this will foster social cohesion, democratic progress and respect of human rights. Since 2008, the EU has established an annual Human Rights Dialogue with Kazakhstan’s national authorities, preceded by regular meetings with local NGOs and annual regional seminars bringing together the EU and Kazakhstan civil society on various topics such as women’s rights or the judicial system and places of detention.

Through open calls for proposals, Kazakhstan NGOs can benefit from EU grants of about €1 million per year under the European Instrument for Democracy and Human Rights aimed at promoting transparency of political and economic processes and respect of human rights. The EU also considers the final Declaration of the December 2010 Astana OSCE Summit and Kazakhstan’s July 2010 UN review of its commitments under the International Covenant on Civil and Political Rights (ICCPR) as important benchmarking tools for our cooperation.

The partnership between the EU and Kazakhstan is also a commitment to work together on global challenges.

Both the EU and Kazakhstan are currently taking stock of their achievements and consider an upgrading of the Partnership and Cooperation Agreement to reflect the progress achieved and to tackle the challenges ahead. Kazakhstan is a key partner for the EU and we look forward to continue and enhance our relations.”

The overall EU cooperation objectives, policy responses and priority fields for Central Asia can be found in the EC Regional Strategy Paper for Central Asia 2007-2013. In addition to the assistance of the Development Cooperation Instrument (DCI), Kazakhstan participates in several ongoing regional programmes.

**FP7 NCP Structure in Kazakhstan**

The National Coordination Board in cooperation with the European Union Framework Programmes on research, technology and innovation development was established on 22 July, 2010 by the order of the Ministry of Education and Science. Eight thematic and three horizontal programmes NCPs were appointed.

A number of local Kazakh institutions participate in the FP7 projects and networks, through which most training and info days are provided. The FP7 National Coordinator Office hosted by InExCB-Kz has developed a special local programme for the training of trainers and cascade training to cover most institutions of Kazakhstan. The consulting service for the FP7 is realised by the FP7 NCPs. Its structure includes the FP7 National Coordinator office in Almaty and Astana, Thematic NCPs offices in Almaty, Astana, and Kurchatov.

FP7 research and CSA projects are co-funded by local partner organisations. There is no financial support received from the government. Some NCPs activities are co-financed by the hosting organisations. FP7 NCPs in Kazakhstan are not able to fulfil all their tasks, including promotion of awareness and information on FP7 priorities and calls for proposals. Moreover, they participate in the FP7 events organised in the EU/AC countries without special political and financial support by the government. This issue is under the consideration of two Kazakh ministries: the Ministry of Education and Science and the Ministry of Industry and New Technologies.
I.5.3 Challenges

Kazakhstan still needs to strengthen the cooperation framework with the EU RTD programmes as well as with the EECA countries. First of all, there is a need to overcome some barriers, such as:

- language and cultural barriers by enhancing the staff exchange under the EU mobility programmes;
- facilitation for visa procedures for both EU and Kazakh researchers;
- enhancement of participation of SMEs (public and private) in national and international programmes providing them with necessary co-funding.

To bring the Kazakh scientific community closer to the EU Framework programmes the first needs are:

- to support politically and financially the EU FP NCP structure within the country;
- for the EC to ensure that all formally appointed NCPs are involved in INCO projects and networks, and to provide them with the necessary funding to participate in the FP7/FP8 training and events conducted in the EU/AC countries;
- conclusion of a special S&T cooperation agreement between the EU and Kazakhstan to facilitate the participation of Kazakh researchers in the EU FP calls and events;
- NCPs should play a significant role in bi- and multilateral S&T cooperation agreements as well;
- NCPs should be involved in the development of STI indicators in the country along with the State Statistic Agency;
- NCPs play a significant role in the increasing participation of the Kazakh scientific community in the EU FP7/FP8 through their daily work such as organisation of training and awareness activities for their local clients. These activities need special funding, which should be allocated from the governmental budget;
- the opening of a Kazakh R&D office in Brussels needs to be planned.

The Government of Kazakhstan should strictly follow the items of the national laws and orders on RTDI in Kazakhstan to provide the Kazakh scientific community with all means to escape brain drain from research and to make R&D activity more attractive to the younger generation.

It is advisable to open the Kazakh FP7 NCP structure under the Ministry of Industry and New Technologies taking into account similarities in the priorities and tasks of the EU FP7 and the Ministry.
I.6 Country Report Kyrgyzstan

I.6.1 Current State of S&T and Major Policy Challenges

In the Kyrgyz Republic, Science and Technology has been one of the core sectors of the economy since before the collapse of the USSR. The current structure of the S&T institutions represents a network of scientific and education institutions distributed among the National Academy of Science, universities and state owned enterprises.

Presently, the S&T system in Kyrgyzstan can be characterised as a combination of a centrally organised administrative system and a few elements that appeared during the transition to a market economy. Policy-making related to reforms in science, technology, and innovation failed to keep pace with other areas of social, political, and economic developments during the last decades of the transition period.

The level of research funding is currently at about 0.2% of the GDP (including 0.07% allocated to the National Academy of Sciences). This level of funding for science in the country can only be spent on scientists’ and researchers’ salaries, rather than on creating new knowledge and development needed to improve the country’s market conditions.

I.6.1.1 S&T Indicators

TABLE 12: S&T LANDSCAPE 2010\textsuperscript{112}

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.21</td>
<td>84</td>
<td>5,125</td>
</tr>
</tbody>
</table>

TABLE 13: EXPENDITURES ON R&D IN KYRGYZSTAN BY YEAR\textsuperscript{113}

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D expenses (million Kyrgyz Som\textsuperscript{114})</th>
<th>R&amp;D expenses per capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>268.3</td>
<td>0.0053</td>
</tr>
<tr>
<td>2007</td>
<td>351.7</td>
<td>0.007</td>
</tr>
<tr>
<td>2008</td>
<td>354.6</td>
<td>0.0071</td>
</tr>
<tr>
<td>2009</td>
<td>292.5</td>
<td>0.0059</td>
</tr>
<tr>
<td>2010</td>
<td>329</td>
<td>0.0066</td>
</tr>
</tbody>
</table>

I.6.1.2 Research Structure and Policy

There are two separate and independent structures in Kyrgyzstan: The Ministry of Science and Education (MSE), and the National Academy of Science (NAS KR), which actually acts as a Ministry itself and coordinates the branched- and university science, as well as academic institutes. Out of this, an Agrarian Science emerged, which is similar to NAS but exists separately and is directly financed by the Ministry of Finance. It does not, and is not required to report to any of the institutions stated above. This shows the lack of a united, centralised state body to coordinate the country’s scientific spheres and to hold one and the same scientific and technical policy for all areas. As a result, we see negative results from this system, rather than positive ones, even at the state level.

The scientific potential of the republic consists of about 5,000 research, science and pedagogical, and research and technical experts, including more than

\textsuperscript{112} National Statistic Committee of the Kyrgyz Republic, 2010
\textsuperscript{113} National Statistic Committee of the Kyrgyz Republic, 2010
\textsuperscript{114} 1 Kyrgyz Som = 0.016 Euro (as of October 2011)
600 doctors (senior scientist/professor equivalent) and 3,000 candidates of sciences (PhD equivalent).

Kyrgyzstan is on the threshold of entering into the industrially innovative phase of economic development. This stage is characterised by the adaptation of science to new economic conditions that should lead to major changes in the structure, organisation, human resources, infrastructure and financial support of this sphere.

The legal basis for national S&T policy: Recently, preconditions have been created upon which the country’s innovative development will be based. Thus, with the purpose of developing and implementing a new public policy in the sphere of science focused on managing practical results in the priority directions of the national economy, the about-turn of innovations development on the Law of the Kyrgyz Republic “On Science and Innovative Activity” was prepared and agreed with the ministries and agencies in 2009.

The Kyrgyz Republic has the following laws and regulations related to S&T:

i) Law on science and state policy on science and technology, 2008
ii) Law on innovative activity, 1999
iii) Regulation on financing of scientific, technical and innovative activities, 1999.

As well as these, the Kyrgyz Republic proposes within the Country Development Strategy the following laws and regulations to foster the development of S&T:

iv) the draft “National Nanotechnology Development Programme in the Kyrgyz Republic for 2008-2010”;
v) the registration of innovations of research institutions of the Kyrgyz Republic;
vii) the draft “Regulations on the National Science and Innovations Fund” was developed, which will allow to accumulate funds allocated for research and innovations, to raise efficiency of their distribution, and to promote the use of the innovation development venture financing with the purpose of supporting local scientists engaged in the given sphere;
vii) the draft “Regulations on the Order of Financing Scientific Research and Technical and Innovative Activity” was developed with funds from the state budget;
viii) the draft “Resolution of the Government of the Kyrgyz Republic on Establishment of the Kyrgyz Technopark”, an industrial park, was designed to stimulate consolidation of financial and technical resources and the testing of innovations.

S&T priorities of the Kyrgyz Republic: Science and innovations have become a productive force for the domestic economy, and priorities for research and innovative activities are linked directly with priorities for social and economic development on the stipulation that the share of applied research and experimental development activities aimed at the introduction of modern energy and resource-saving technologies will increase to provide power and food security.

The Country Development Strategy for 2009-2011 was developed with the purpose of creating a comprehensive solution for social and economic tasks, approved by the National Council for the strategic development of the Kyrgyz Republic. The Country Development Strategy covers a variety of socio-economic development aspects and particular attention is paid to the development of science and innovation. The following fields of S&T are important for the development of the country:

• Information and communication technologies
• Food security
• Environmental protection
• Energy and water technologies
• Biotechnologies

I.6.1.3 Important research organisations

The National Academy of Sciences of the Kyrgyz Republic carries out research in natural, engineering, and social sciences, trains scientists in all fields of knowledge, advises the government on S&T policy, and disseminates knowledge. The NAS defines the research topics in the national research institutions, coordinates basic research funded by the state, participates in international cooperation on S&T, and organises symposiums and conferences to discuss science issues and to coordinate research. As of 2010, there are twenty-two research institutes with thirty-seven academicians, fifty-seven corresponding members, and seven foreign members. The most acute problem of the NAS KR is the very low level of research funding and the remuneration of scientists. Today, funding of academic science is 0.07% of GDP. There
is no funding for articles; nonetheless, the budget covers expenses related to field expeditions, travel expenses to attend international scientific conferences, purchase of scientific instruments and reagents, the publication of books, magazines and others. A lack of economic incentives in connection with the egalitarian principle of payment reduces efficiency.

There are several spin-offs within different departments of the NAS which continue successful operations through innovative self-financing structures such as, IC “Shakirt”, SIC “Geopribor”, SPC “Geoservice” etc.

The Ministry of Education and Science of the Kyrgyz Republic: Education and science policy of the Kyrgyz Republic at governmental level is developed and coordinated by the Ministry of Education and Science. The Ministry also certifies the main S&T research institutions.

There are nineteen Kyrgyz universities which conduct different types of research, such as information and telecommunication technologies, electronics and problems of applied mathematics, parallel computing technologies, modern technologies of mining operations, agricultural techniques as well as bio-diversity and environment.

The State Service on Intellectual Property and Innovation (Kyrgyz Patent) deals with intellectual property rights and promotion of innovation. It was established by Government decree and it represents the Kyrgyz Republic at the World Intellectual Property Organization and other international and interstate organizations on intellectual property protection.

I.6.2 Current Trends & Challenges in International Cooperation

I.6.2.1 National Policies
The Kyrgyz Republic Law on “Science and Basics of State Policy on Science and Technology” from 2008 supports activities related to S&T, such as the conduction of joint researches, the organisation of scientific conferences and symposia and the creation of joint research centres and organisations.

I.6.2.2 Bilateral Agreements
Since 1991, the Kyrgyz Republic has signed S&T cooperation agreements with countries of the EECA Region, like Russia, Kazakhstan, Armenia, Georgia, Turkey, Uzbekistan, Tajikistan, Georgia, Ukraine, Belarus, and Moldova. Also, the Kyrgyz Republic has bilateral agreements on S&T with EU countries: the UK, Germany, France, Italy, and Latvia.

Moreover, the Kyrgyz Republic has bilateral agreements on scientific cooperation with Mongolia, China, India, Tunisia etc.

There are about ninety-four agreements at the institute level with organisations like NATO, NCCR, DAAD, the Academies of Sciences of countries such as Switzerland, Germany, the USA, China, Russia etc.

- Cooperative agreement between the Government of KR and the German GeoForschungsZentrum, Potsdam/ Germany, on establishing a Central Asian Institute for Applied Geosciences (2002)
- Memorandum of Understanding with the Swiss National Centre of Competence in Research North-South (NCCR Programme) (2003)
- A Memorandum of Mutual Understanding with the World Innovation Foundation for a joint establishment of an international public research centre (incubator) in the Kyrgyz Republic (2005)
- Protocol of intentions with the project “Virtual Silk Way” under the NATO science programme “Security Through Science” and the association “Kyrgyz Scientific and Educational Computer Network” (2005)
- Cooperative agreement with the Russian Foundation for Fundamental Research (2007)

I.6.2.3 Regional Network / Cooperation
The Kyrgyz Republic has a close scientific and technical collaboration with neighbouring countries like, Kazakhstan, Uzbekistan, Tajikistan and China. Moreover, Kyrgyzstan cooperates with Kazakhstan, Tajikistan, Russia, Armenia, Belarus and Georgia within the international programme ISTC and the University of Central Asia which operates in Kazakhstan, Kyrgyzstan and Tajikistan. Therefore, possibilities for joint research in the mountainous regions of these three countries are offered.

I.6.2.4 EU - Central Asia Strategy
The EU – Central Asia Strategy focuses on investing into the future: youth and education, and promoting economic development, trade and investment. Under the first initiative, the EU supports the cooperation in
higher education, the academic and student exchanges, for instance, under the new Erasmus Mundus facility and TEMPUS and bilaterally. The economic development initiative supports economic diversification with a view to promoting sustainable development by improving local skills and potential (science and technology, innovation, tourism), the promotion of SMEs and the development of basic infrastructure (road, rail, telecom, IT).

I.6.2.5 Partnership and Cooperation Agreements (PCAs)
The Kyrgyz Republic and the EU signed a Partnership and Cooperation Agreement in 1995. Article 51 of this PCA covers S&T cooperation by both parties promoting the exchange of scientific and technical information, joint RTD activities, training activities and mobility programmes for researchers.

I.6.2.6 National and Bilateral Programmes
- Concept of State Innovation Policy in 2003-2005
- New Foundation to support research studies and researchers, jointly established by the German and Kyrgyz Governments, 2003

I.6.2.7 EU Framework Programme for Research and Technological Development
- The National Library of the Kyrgyz Republic is operating as a National Contact Point for FP7 in Kyrgyzstan, covering general coordination of the activities. Currently, the NCP is planning to appoint certain institutes to act as a NCP in respected fields of research.
- So far, there have been seven projects and country related participations in the FP7.
- The EC contribution to the Kyrgyz Republic’s participation in the FP accounts for €145,500.

I.6.2.8 Development Co-operation Instrument (DCI)
DCI is being successfully realized in the Kyrgyz Republic. The duration of the project is from 2007-2013. The Kyrgyz Republic is one of the beneficiaries of the project, and the executives of the project include diverse organizations, such as consulting companies, international organizations, and NGOs.

DCI covered a variety of socio-economic activities in the Kyrgyz Republic, national and regional projects within the Central Asia Regional Strategy and the Indicative Programme 2007-2010. One of the tasks of this programme is the promotion of educational exchanges, scientific and People-to-People activities.

The indicative budget both for regional and bilateral allocations is €719 million. It is broken down as follows:
- Regional component: 30-35%
- National component: 65-70%

I.6.2.9 Lifelong Learning Programme (LLL)
Kyrgyzstan participates in the TEMPUS and the ERASMUS MUNDUS Programmes of the EU. The duration of the project is from 2007-2013. The EC’s contributions in 2008-2010 amounted to €14 million. The Kyrgyz Republic is one of the beneficiaries among other Central Asian states. Project executives include universities, student organizations, and NGOs of the Kyrgyz Republic.

According to the Country Strategy Paper for 2009-2011, education remains a key priority for the country’s development and the Kyrgyz Republic confirmed its intention to adopt the principles of the Bologna process, as promoted and tested through TEMPUS. The strategy aims at providing a new legal basis for the reform of higher education: adapting the qualifications to labour market needs; harmonising higher education in line with international standards to enhance equity and student mobility; introducing a faculty attestation and incentive system; developing a comprehensive quality assurance system; and reviewing the current funding mechanisms.

There are seven projects under TEMPUS IV ongoing in Kyrgyz Republic:
- Master «Interperoblite/Securite/Certification » dans le domaine du Transport International Ferroviaire en Ukraine et en Asie Centrale
- Awareness raising, Interest development, Desire creation and Action stimulation on the Bologna Process expansion in Central Asian countries and Russia
- Plan to Establish Research-Science-Enterprise oriented Universities for the benefit of Society
- Central Asian Network for Quality Assurance and Accreditation
- Towards sustainable water resources management in Central Asia
- Reseau Europe-Russie-Asie Centrale de Masters « Informatique Seconde Competence » (ERAMIS)
- Higher Education Initiative for Informatics in Central Asia.

ANNEX – Country Report Kyrgyzstan 139
I.6.3 Challenges

The major challenges of S&T in Kyrgyzstan are divided into several blocks:

1. Research personnel are slowly replaced by young scientists which results in a loss of continuity. The mean age of experts carrying out research and development activities in 2006 was 46.6 years, while that of candidates of sciences was 50.5 years and of PhDs 58.1 years. At present, the society does not consider science as the major factor of the economic development and research activity is not considered prestigious and worthy of high material support. Accordingly, the research activity incentive system is not developed.

2. The organisational structure of science lacks a decision-making system regarding the use of resources and the potential of the private sector. The fact that research and development programmes are financed from the republican budget and are headed by a number of managers, complicates the coordination of research activities carried out in the country.

3. Structural disproportions in the organisation of research activities have led to a lack of demand for results. One of the characteristic features of today’s scientific and innovative activity is that a substantial 47% of fundamental research is allocated to science – exceeding twice the world level – whereas slightly more than 17% is allocated to applied research, and only 3% to experimental development activities. The specific weight of funds directed to financing of development in engineering sciences does not exceed 19%, notwithstanding the fact that much needed power and resource-saving issues as well as alternative energy sources remain unsolved. Therefore, science is not able to respond to the threats of energy and food crises faced by the country.

4. Conditions for the reproduction of science manpower resources were complicated in connection with the leaving of highly qualified scientists for other spheres of economic activities. Thus, the number of employees engaged in scientific and innovative research and development in Kyrgyzstan, as compared with 1991, was reduced more than twofold. There is an outflow of scientific personnel abroad and a lack of inflow of new young specialists in domestic science, which lead to a break of continuity.

5. Participation of higher education in research activities is becoming less, which is a consequence of its reorientation mainly to educational functions due to a bias towards commercialisation. This has led to negative tendencies in the training of scientific personnel, such as: an increase in the proportion of dissertations by applicants who do not work fully in scholarship, a lack of motivation of scientific workers to continue their professional development after obtaining a degree without the prospect of material security, etc.

6. The number of publications and patents by domestic scientists is reducing. The available innovative potential does not conform to production needs and leads to communication gaps between science and industry. A problematic approach to financing is used – the financing of scientific research in strict conformity with protected items of the budget economic classification focuses on scientific institutions and resources, but not on results. Since the laboratory and instrument base is obsolete, this circumstance does not allow conducting research and development which would satisfy consumers’ demands.

7. The analysis of the scientific and innovative activity status in Kyrgyzstan shows that this sphere does not serve as a guarantee for a sustainable economic development. Moreover, science appeared to be excluded from the economic reform process that prevented it from laying the ‘scientific groundwork’ urgently needed for the activation of economic and social progress.

8. There is no mechanism to attract private business for the development of scientific potential which explains businesses’ low activity in the R&D sphere. Nevertheless, the development and introduction of high technology production and innovative technologies in manufacture are key factors for the achievement of a competitive advantage.

All of the above clearly show the urgent need for a radical reform in the sphere of science in Kyrgyzstan.
### I.7 Country Report Moldova

#### I.7.1 Current State of S&T and Major Policy Challenges

**TABLE 14: S&T LANDSCAPE 2010**

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.42</td>
<td>38</td>
<td>4,554(^{115})</td>
</tr>
</tbody>
</table>

#### I.7.1.1 Research Structure and Policy

The main legal acts which regulate the activity in the field of S&T in the Republic of Moldova are the **Code of the Republic of Moldova on Science and Innovation** adopted on 15 July, 2004, and the **Partnership Agreement between the Government and the Academy of Sciences of Moldova (ASM)**, presently for the period of 2009-2012, which authorises the ASM with the Government’s competence in the field of scientific research.

The basic goal of the state policy in the field of science and innovations is a stable socio-economic and human development in the Republic of Moldova, based on maximum stimulation and the use of scientific, scientific-technical and technological potential, oriented towards the creation and commercialisation of competitive and ecologically pure produce, products, services, and processes.

The strategic priorities in the field of science and innovation consist in:

- strengthening the State of Law and use of cultural heritage in the perspective of European integration;
- efficient use of human, natural and information resources for sustainable development;
- biomedicine, pharmaceutics and human health;
- agricultural biotechnology, soil fertility and food security;
- nanotechnology, industrial engineering, new materials and products;
- efficient growth of the energy complex, assurance of energy security, including the use of renewable resources.

#### I.7.1.2 Important Research Organisations

The Academy of Sciences coordinates the scientific and innovation activities, and is the supreme scientific forum and scientific adviser to the public authorities. Within the Academy of Sciences of Moldova three scientific divisions and two subdivisions are active:

- Division of natural and life sciences, with two subdivisions: on medical sciences and agricultural sciences
- Division of exact and economic sciences
- Division of social sciences and humanities

On 01 January 2011, thirty-eight institutions in the field of research and innovation, including twenty-one institutions of the Academy of Sciences of Moldova, fifteen accredited universities and two affiliated organisations were registered. The total number of employed persons was 4,764, including 3,190 researchers, 1,054 researchers with PhD degrees and 310 professors.

The economic-financial crisis caused a decrease in financial allocations in the field of science and innovation from 0.7% of the GDP in 2008 to 0.42% in 2010.

The main Universities which act in the field of S&I are the following:

- the Moldova State University\(^{116}\)
- the Academy of Economic Studies of Moldova\(^{117}\)
- the State University of Medicine and Pharmaceutics “Nicolae Testemițanu”\(^{118}\)

\(^{115}\) The Court of Accounts of Moldova Report. Published: 13.05.2011 in Monitorul Oficial Nr. 78-81 http://lex.justice.md/viewdoc.php?action=view&view=doc&id=338497&lang=1

\(^{116}\) http://usm.md/

\(^{117}\) http://ase.md/

\(^{118}\) http://usmf.md/
• the Technical University of Moldova\textsuperscript{119}
• the State Agricultural University of Moldova\textsuperscript{120}.

Institutional evaluation and scientists’ attestation is the competence of the National Council for Attestation and Accreditation. The accreditation system of institutions from the field of science and innovation will give them the possibility to obtain financial support from the State Budget.

The State Agency on Intellectual Property (AGEPI) deals with intellectual property rights. It was established on the basis of the Code of Science and Innovation and it represents the Republic of Moldova at the World Intellectual Property Organization and other international and interstate organizations on intellectual property protection. AGEPI supports and develops cooperation with them as well as with high profile establishments from other states.

The Agency for Innovation and Technology Transfer (AITT) is authorised with the function to implement innovation and technology transfer strategies and policies, and promotes the development of the innovation infrastructure in the country.

In order to develop S&T activities, the private sector may use the innovation infrastructure components: Scientific and Technological Parks “Academica,” “InAgro,” “Micronanotech” and the Innovation Incubator “Inovatorul” which are managed and supervised by AITT. At the present moment, about fifty companies perform their activities in the above mentioned structures.

I.7.2 Current Trends & Challenges in International Cooperation

I.7.2.1 National Policies
According to Article 160 of the Code of the Republic of Moldova on Science and Innovation, the state supports the extension of cooperation with foreign partners in the field of science and innovation, and it creates favourable conditions for integration in the international scientific-technical community in accordance with the legislation in force. In order to foster international cooperation and the integration in ERA, the “Moldova Knowledge Excellence Initiative”

Action Plan was adopted in 2008 by the Supreme Council for Science and Technological Development of ASM.

I.7.2.2 Bilateral Agreements
According to the Code on Science and Innovation, ASM has the prerogative to conclude science and technology agreements on behalf of the Government.

ASM has signed over forty bilateral scientific agreements and collaborates on their basis with various research institutions.

I.7.2.3 Regional Network / Cooperation
Moldova participates in international programmes, especially in FP7 with the following EU countries: Greece, Romania, Bulgaria, France, Italy, Great Britain, Germany and Austria. In 1992 the country became a member of the Joint Institute for Nuclear Research (JINR) in Dubna.

I.7.2.4 EU - European Neighbourhood Policy
A joint ENP Action Plan was adopted in February 2005 by the EU-Moldova Cooperation Council. The EU-Moldova ENP Action Plan stipulates the following priorities concerning research, development and innovation activities: Preparing Moldova’s integration into the European Research Area and into the Community R&D Framework Programmes on the basis of scientific excellence; developing Moldova’s capacity in technological R&D to support the economy and society; supporting Moldova’s integration into high level scientific exchanges. Due to joint efforts of the Academy of Sciences and the Moldovan Government and with the support of the European Commission, the Republic of Moldova became an Associated Country to the Seventh Framework Programme in January 2012.

I.7.2.5 Partnership and Cooperation Agreements (PCAs)
The Partnership & Cooperation Agreement (PCA) is the legal basis for EU relations with Moldova. The PCA came into force in July 1998 for an initial period of ten years. It established the institutional framework for bilateral relations, set the principal common objectives, and called for activities and dialogue in a number of policy areas.

\textsuperscript{119} http://utm.md/
\textsuperscript{120} http://www.iasm.md/u/
I.7.2.6 National and Bilateral Programmes

Bilateral programmes:

- Collaborative Call between the German Federal Ministry of Education and Research (BMBF) and the Academy of Sciences of Moldova (ASM); Start date: 14.03.2008
- S&T Cooperation Programme between the National Authority for Scientific Research of Romania (ANCS) and the Academy of Sciences of Moldova (ASM) for the years 2010-2012; Start date: 07.11.2009
- Collaborative Call between the BRFFR (Belarusian Republican Foundation for the Fundamental Research) and the Academy of Sciences of Moldova (ASM); Start date: 03.05.2007
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the Russian Foundation for Basic Research (RFBR); Start date: 2006
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the Russian Foundation for the Humanities (RFH); Start date: 01.07.2009
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the Ministry of Education and Science of Ukraine (MESU); Start date: 02.12.2008
- STCU (Science and Technology Centre in Ukraine) and ASM - Common Research-Development Initiatives
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and the National Research Council of Italy (CNR); Start date: 23.06.2010
- Collaborative Call between the Academy of Sciences of Moldova (ASM) and National Centre for Scientific Research of France (CNRS); Start date: 01.01.2012

I.7.2.7 EU Framework Programme for Research and Technological Development

As a result of a contest among young researchers announced in 2008 by the Supreme Council for Science and Technological Development of the Academy of Sciences of Moldova, six young researchers were nominated as National Contact Points for cooperation and financial NCP. Besides those, an NCP for mobility was nominated within the Centre for International Projects of the ASM and an SME NCP -within the Agency for Innovation and Technology Transfer of the ASM. Regional Information Points are in the process of creation. The activity of this network is coordinated by the Centre for International Projects within ASM. Since the 7th Framework Programme was launched, more than 120 proposals with the participation of Moldovan research groups (including research institutions, higher education institutions, SMEs and NGOs) have been submitted and sixteen were accepted for funding. The contribution of the European Commission for Moldova's participation is about €1,600,000.

I.7.2.8 European Neighbourhood Policy Instrument (ENPI)

A Country Strategy Paper for Moldova was elaborated by the European Commission for 2007-2013. The CSP lists the objectives of EU/EC cooperation with Moldova and outlines the Moldovan policy agenda, as well as the country's political, economic, social and environmental situation. Assistance provided under the national ENPI envelope for Moldova will focus on three priority areas: Support for Democratic Development and Good Governance, Support for Regulatory Reform and Administrative Capacity Building, Support for Poverty Reduction and Economic Growth. S&T is not among the main priorities. Under the National Indicative Programme 2011-2013, Moldova will receive €273.14 million from the (ENPI).

I.7.2.9 Lifelong Learning Programme (LLL)

In 1994, the Republic of Moldova joined the TEMPUS programme. Its initial focus was on university management, curriculum development, and teaching staff retraining in the fields of social work, communication studies, modern European languages, and economics. Since 2000 Moldovan non-academic actors — in particular government organisations and, to a lesser extent, enterprises — have gradually become more active in TEMPUS projects. For the period of 2009-2011, eight projects with Moldovan partners were selected for funding.

Moldova joined the Erasmus-Mundus Programme in 2004. Higher education institutions from Moldova have participated actively in the Erasmus-Mundus External Cooperation Window since 2007. In 2010 the Moldova State University became the first Moldovan university to be selected as a full partner in an Erasmus Mundus Action 1 project, delivering a master's course on Migration with EU partner universities. Student and academic mobility was further enhanced under Action 2 with the expected award of sixty-six grants.
I.7.3 Challenges

One of the main challenges is to identify the proper role of S&T in tackling societal needs and strengthening the competitiveness of the national economy. The recognition of science as a national priority should be expressed within the national strategy papers. Reducing the public funds allocated to R&D will diminish the positive trend registered after 2004 and will have a negative influence on upgrading the scientific infrastructure. The connection between science and business should be fostered and new mechanisms for attracting private investments in R&D need to be launched. Science is still not an attractive area for the younger generation. More than this, due to a wage disparity between Moldova and main EU partner countries, the emigration of young scientists will not diminish in the short and medium term. Following the association of Moldova to the Seventh Framework Programme, the status of an associated country should be properly explored: increasing the rate of participation, raising visibility within ERA, participating in the programme committees, reintegrating grants for the diaspora, etc.
I.8 Country Report Russia

I.8.1 Current State of S&T and Major Policy Challenges

I.8.1.1 S&T Indicators

**TABLE 15: S&T LANDSCAPE 2010**  

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP, 2009</th>
<th>Number of research organisations, 2009</th>
<th>Number of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.24</td>
<td>3,536</td>
<td>369,237</td>
</tr>
</tbody>
</table>

I.8.1.2 Research Structure and Policy

The legal basis for national S&T policy is the Federal Law No. 127 “On Science and State S&T Policy” of 1996, which was amended more than a dozen times in 1998-2009. The Law regulates relations among various actors of the S&T sphere, state authorities and consumers of S&T outcomes. It defines the scientific activity as an activity which is aimed at obtaining and applying new knowledge. The Law also sets the legal status of the S&T personnel and S&T organisations, as well as the typology of the latter. Most significant is that the law sets the status of the Russian Academy of Sciences.

The law “On Protection of Competition” passed by the Federal Assembly of the Russian Federation in late 2005 plays an important role in the competitive distribution of the biggest part of S&T government funding to all kinds of recipients.

As of 2006, the Russian research and education policy has been supported with a number of important laws and the launch of the National Priority Project “Education” (PNPO), which was overseen by the Russian President Dmitry Medvedev in his former position as Vice Prime Minister. The main S&T related laws and documents passed in 2006 were the following:

- The federal law on the introduction of a Unified State Examination at the end of secondary education
- Amendments to the federal law “On science and state policy in science and technology”
- The federal law “On autonomous institutions”, which allows to establish new kinds of government ‘autonomous’ institutions
- Section 4 of the Civil Code on the “protection of intellectual property”

The evolution of S&T and innovation legislation continued thereafter. The federal law “On introducing changes to selected legislative acts of the RF for creating favourable fiscal conditions for financial support to innovation activity” came into force on 1 January, 2008. In addition, a federal law concerning the development of SMEs was adopted.

The federal law No. 217 from 24 July, 2009 allowed state educational and scientific organisations to found commercial entities for the commercialisation of their intellectual activity results. Among other important features of the Russian legislation on S&T and innovation is the transition towards performance-based budgeting and performance evaluation. This transition is based on decrees of the Ministry of Education and Science on individual performance-based bonuses and on measuring the performance of R&D institutes. The implementation of these reforms progresses slowly.

The regular research-based identification of national S&T priorities started at the federal level in the middle of the 1990s. National S&T priorities are formulated in two lists: priority S&T areas and critical technolo-

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124 Information about the Project is accessible at the web-site of the Ministry of Education and Science http://mon.gov.ru/pro/pnpo/
gories\textsuperscript{126}. A regular revision of critical technologies takes place every three to four years. In 2000-2001, new lists of nine S&T priority areas and fifty-two critical technologies were identified. The main changes consisted in the optimisation of the number of priority areas and in concentrating resources in the most important fields of innovation.

In 2002 the Russian President approved the “Basic directions of the Russian Federation’s policy in S&T development”\textsuperscript{127} for the period 2010 and onwards. This document has become an important element of Russia’s social and economic development strategy, aimed at promoting innovation-based economic development, creating an efficient national innovation system and making S&T one of Russia’s key priorities.

The most recent update of country priorities was made by the President’s decree of 7 July, 2011\textsuperscript{128}. The list of priority directions, supported with a more detailed list of twenty-seven critical technologies\textsuperscript{129}, covers the following areas:

1. Security and counterterrorism
2. Nanosystems and materials industry
3. Information and telecommunication systems
4. Life sciences
5. Advanced weapons, military and special equipment
6. Rational use of nature
7. Transport and space systems
8. Energy efficiency, energy saving and nuclear energy

Moreover, in his address to the Federal Assembly on 12 November, 2009, President Medvedev named the five priorities for modernization of the Russian economy and Russia’s technological development: introduction of advanced medicine, nuclear energy, information technology, development of space and telecommunication systems, and the dramatic increase of energy efficiency. The presidential Commission on Modernization and Technological Development of Russia’s Economy approved a list of projects in all five priority areas with detailed action plans, which are being implemented\textsuperscript{130}.

Among the recent policy activities is the recurrent and open revision process of Russia’s S&T priorities, the Government’s decree on the performance assessment of R&D organisations and the launch of a federal funding programme “Scientific and scientific-pedagogical personnel of innovative Russia” (approx. €2.3 billion until 2013).

A federal programme targeting the creation of a network of technoparks was initiated in 2006 and has been expanded in recent years\textsuperscript{131}.

I.8.1.3 Important Research Organisations

**Russian Academy of Science**

The Russian Academy of Sciences (RAS) is still today the most important Russian research organisation. It absorbs around a third of the Russian civilian R&D budget or more than RUB 50 billion (€1.4 billion) per year\textsuperscript{132}. The Russian Academy of Science (including its Ural, Siberian and Far Eastern branches) was the recipient of 61.5% of state funds for basic research in 2009 and 64.2 in 2010. In comparison, the Russian Foundation for Basic Research received 8.9% and 7.8% respectively and the Russian Foundation for Humanities only 1.5 and 1.3% respectively\textsuperscript{133}.

RAS is a civil self-governed non-commercial institution which includes scientific, science support and social organisations. Its structure comprises discipline and branch specific divisions, regional RAS divisions and regional RAS scientific research centres (Figure 1). The

\textsuperscript{126} Priority S&T areas are areas with a potential to make a major contribution towards providing the country with more security, faster economic growth, greater competitive capacity of Russian companies through the development of the technological foundations of the national economy and R&D-intensive production facilities.

Critical technologies are considered as sets of technological solutions that create potential for further development of various technological areas, and which offer a broad range of innovative applications in various sectors of the economy.

\textsuperscript{127} Letter of the Russian President of 30 March, 2002 No. Пр-576.


\textsuperscript{129} http://news.kremlin.ru/news/11861

\textsuperscript{130} http://news.kremlin.ru/ref_notes/988

\textsuperscript{131} http://www.kremlin.ru/ transcripts/5979


principal objective of the regional branches consists in organising and implementing scientific research, as well as promoting the most appropriate development for the region and the Russian Federation as a whole. They include scientific centres, institutes, other scientific organisations, science support and social organisations.

FIGURE 1: STRUCTURE OF THE RUSSIAN ACADEMY OF SCIENCES

Russian Academy of Sciences
(97,000 personnel, including 57,000 researchers)

9 specialised scientific branches
3 territorial branches
14 regional scientific centres

Siberian branch (23% personnel)
Ural branch (6.5% personnel)
Far Eastern branch (5.7% personnel)

More than a third of unique scientific installations belong to the institutions of the public academies of science\textsuperscript{134}. The Russian Academy of Sciences and the other public academies of sciences have drawn up their own list of unique facilities. The list includes twenty-six infrastructures.

\textbf{Kurtschatov-Institute, Research Centres, (from ERA.Net RUS D.1.1.1.- the Russian S&T System )}

The National Research Centre (NRC) “Kurchatov institute” was created as a pilot project on 28 April, 2008 according to the decree issued by the President of the Russian Federation V. V. Vladimir Putin\textsuperscript{135}. It concentrates on the following:

- boosting the commercialisation of research results and carrying out complete and innovative research and development activities, including the creation of industrial samples, in priority areas for the development of science, technologies and techniques in the Russian Federation, such as: “Industry of nanosystems and materials” and “Power engineering and power savings”;
- coordinating scientific activities for the implementation of the Presidential initiative “Strategy for the development of nanoindustry”;
- developing principles for the construction and functioning of national research centres.

In addition to its primary activities, the NRC “Kur-

In the pilot project for the creation of the NRC are taking part, besides the Russian Research Centre “Kurchatov Institute” (RRC KI) (Moscow), a few other leading Russian research institutions, such as the Konstantinov Institute of Nuclear Science (PNPI) (Gatchina near St.Petersburg), the High-Energy Physics Institute (IHEP) (Protvino, Moscow region) and the Institute of Theoretical and Experimental Physics (ITEP) (Moscow). These are the leading Russian centres in the field of nuclear physics and they have various large and unique research facilities.

In order to ensure favourable conditions for the successful implementation of the project, the Russian Research Centre “Kurchatov Institute” comes under the direct responsibility of the Government by order from 14 December, 2009\textsuperscript{136}.

Russia utilizes a range of major research infrastruc-

\textsuperscript{134} RAS, Russian Academy of Medical Sciences, Russian Academy of Education, Russian Academy of Arts, Russian Academy of Architecture and Construction Sciences

\textsuperscript{135} http://www.kiae.ru/index34.html

\textsuperscript{136} http://www.kiae.ru/index37.html
tures, especially in physics. As a leading scientific power in nuclear energy, military technologies and in aeronautic and space research, the country has built respective research infrastructures. Some of the main installations are located at the Kurchatov Institute in Moscow (synchrotron centre, neutron reactor, beam technology).

The infrastructural side of innovation in Russia is implemented through three main instruments: Special Economic Zones, Technology Parks, and Science Cities.

Special Economic Zones (SEZ) are government-defined territories within the Russian Federation, which are subject to special enterprise laws. The Law on Special Economic Zones took effect on 1 January, 2006 and states that SEZs have to comply with one of the following three types: Industrial-productive, Technological-innovative, or Tourist-recreational zone. This law stipulates significant tax and customs benefits for SEZ businesses and residents; for example, Unified Social Tax is reduced from 26% to 14% in technological-innovative SEZs. Residents of industrial-productive SEZs are exempt from land tax and income tax for five years. In addition, all imported technical equipment and materials are exempt from customs duties.

The concept of a “Technology Park” encompasses the entire development and production chain of a product right up to the marketed item: idea > development > prototype > production planning > production > market introduction > sales. Technology Parks are environments used for piloting new financing models for the promotion of technological innovation and the use of risk capital. Small and Medium-sized Enterprises (SMEs) are the primary target group of Russia’s Technology Parks.

In the former Soviet Union, Science Cities (naukogrady) were created as part of closed-off, large-scale military and industrial complexes (‘closed cities’). They relied entirely on public funding. This system has been reformed in recent years. The title naukograd is conferred by the Government of the Russian Federation. Science Cities comprise of highly qualified personnel, of science, infrastructure and development concepts, as well as a range of special subsidies. The funding of Science Cities is ensured by the federal budget, the budget of subjects of the Russian Federation (e.g. regions) and others sources of funding. Material and technical infrastructures can also be financed by the local budget. At the beginning of 2010, President Medvedev took a new step for stimulating innovation technologies in Russia. He launched the initiative of a “Russian Silicon Valley,” a high-tech city for young, creative scientists and entrepreneurs, to be built from scratch in the Moscow region town of Skolkovo, presentely hosting only a business school. The new town will follow five presidential priorities for modernisation: energy, IT, telecommunications, biotechnology and nuclear technology. The project, which would cost up to $4 bn, will be funded from the Government’s modernization and innovation budget. It will have to overcome the difficulties of creating innovation centres under ‘hothouse conditions,’ for example in the form of SEZ, which have proved to be largely unsuccessful.

Universities
One of the noticeable recent trends in the Russian S&T policy is the redistribution of state funding in favour of universities (including the creation of federal universities and national research universities). Clearly, reinforced research universities, working in closer synergy with the best public research institutes, as well as a new generation of firms, managers and entrepreneurs can be powerful additional engines of innovation.

Seven federal universities were created in 2007-2009 in all federal districts. The first two pilot universities were formed in Southern and Siberian federal districts. Each of these obtained approximately RUB 6 bn. (approximately €150 m at current prices) for their development programmes in 2007-2009. On 21 October, 2009 the Presidential decree established five more universities in the remaining federal districts.

In 2009-2010 the Russian Government also established National Research Universities in order to increase synergies between research and higher education, and to create centres of excellence across the Russian territory. After a competitive examination, twelve National Research Universities were selected for a period of ten years, and in 2010, fifteen more universities were approved, bringing the total number to twenty-nine. They will each receive an amount of RUB 1.8 bn (approximately €45 million at current prices) each year over a period of five years.

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Private Sector

The innovation activity of Russian firms remains rather low and the share of innovators is around 9-10%.\(^{140}\) Moreover, business contributes little to the national expenditure on R&D: the business enterprise expenditure for R&D (BERD) fluctuates around 30% (28.7% in 2008)\(^{141}\). Production enterprises perform relatively little in-house R&D. The mostly publicly owned former branch institutes and design bureaus, separated organisationally from production enterprises, perform more than 80% of business enterprise R&D, half of which operate in the defence sector.

The core enterprises of the Russian Federation’s corporate sector bear some legacy of the Soviet system and the subsequent privatisations, economic downturns, restructuring and transitions. The corporate governance system in modern Russia is characterised by some form of control the state has in many Russian enterprises, especially in the extractive industry. State-owned enterprises are found in various sectors. They often are a monopoly in the respective industry and in many instances incorporate research organisations.

The Russian private sector innovators face a number of challenges, including the lack of external financing for high-risk innovation. Since 1994 a dedicated public non-profit organisation, the Foundation for the Support to Small Innovative Enterprises (FASIE), with resources of up to 1.5% of the total civil R&D budget, provides a variety of support measures, ranging from direct financial support to start-ups to the provision of support services to small innovative enterprises.

The Russian Venture Company (RVC) was founded by the federal government in 2006 with the mission to stimulate the creation of a venture capital industry in Russia. RVC financially participates in the creation of regional venture funds (twenty-three funds were created in twenty-one regions). By mid-2009 less than fifty companies benefited from both the national and regional funds, partly due to lack of good quality applications.

Furthermore, a variety of technoparks, business centres, and business incubators are working across Russia, some of which have been successful in developing innovative businesses (e.g. Tomsk Innovation Technology Centre “Technopark”).

I.8.2 Current Trends & Challenges in International Cooperation

I.8.2.1 National Policies

Favourable regulations for international S&T cooperation are stated in the Russian Federal law No. 127 of 1996\(^ {142}\). The “Strategy for the Development of Science and Innovation in the RF for the Period until 2015”\(^ {143}\) includes a short chapter on positioning the Russian research sector in a global context with an accent on cooperation with the EU. The federal targeted programme “Research and Development in Priority Fields of the Russian S&T System, 2007-2012” allows the participation of foreign scholars and entities.

The Russian Venture Company (RVC) was founded by the federal government in 2006 with the mission to stimulate the creation of a venture capital industry in Russia. RVC financially participates in the creation of regional venture funds (twenty-three funds were created in twenty-one regions). By mid-2009 less than fifty companies benefited from both the national and regional funds, partly due to lack of good quality applications.

I.8.2.2 Bilateral Agreements

Scientific ties between Europe and Russia have always been very tight. As a proof, Russia has nineteen bilateral S&T cooperation agreements with the Member States and Associated Countries\(^ {144}\). Multiple sectoral agreements exist between Russia and the EU, and between Russia and EU member states\(^ {145}\).

On 19 May, 2011, the draft Intergovernmental programme for cooperation of CIS States in the sphere of innovation until 2020 was adopted at the 57th meeting of the Heads of State of the Commonwealth of Independent States. The draft programme consists of five sub-programmes: intergovernmental cooperation in the sphere of innovation; development of S&T capacities; R&D personnel; joint use and development of innovation infrastructure; and intergovernmental regulations of innovation activity. Each of these sub-

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141 Science Indicators: 2010. Statistical Databook. Higher School of Economics, Moscow
142 According to Article 16 “International Scientific and S&T Cooperation of the Russian Federation” of the Federal Law No. 127-FZ of 23 August, 1996 “On Science and State Policy” “Public authorities of the Russian Federation create the necessary conditions for international scientific and S&T cooperation. The actors in scientific and/or S&T activities may join international scientific and S&T organisations or associations, participate in international scientific and S&T programmes or projects, scientific and S&T programmes or projects of foreign countries, conclude agreements (contracts) and other agreements with foreign legal entities to perform work in or outside of the Russian Federation in the procedure prescribed by the legislation of the Russian Federation”
144 Austria, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Israel, Italy, Netherlands, Norway, Poland, Republic of Macedonia, Romania, Slovak Republic, Slovenia, Spain, Turkey, United Kingdom.
145 For the full list of agreements see http://ec.europa.eu/world/agreements/searchByCountryAndContinent.do?countryId=3853&countryName=Russia
programmes is formed as an inter-governmental targeted programme.

Information and data on the bilateral S&T cooperation programmes were gathered in the course of the FP7 ERA.Net RUS project by means of a survey. From the survey and interview data analysis, it can be concluded that an impressive wealth of S&T cooperation exists at a bilateral as well as a multilateral level between Russia, on the one hand, and the EU Member States and Associated Countries to the FP7 (EU MS/AC) on the other. At the bilateral level, several countries stand out with a comprehensive cooperation with Russia. This concerns above all the big EU countries Germany and France. Several smaller countries also have a remarkable tradition of cooperation with Russia. For example, the Nordic countries Finland and Norway have substantial cooperation programmes in monetary terms. Austria, Greece, Italy, Israel, Poland, Switzerland, and the UK traditionally have a good and comprehensive S&T cooperation with Russia as well.

The RAS international cooperation policies target the study and analysis of international scientific achievements in order to use them in Russia and the development of international scientific cooperation. Collaboration with foreign partners is carried out through agreements for scientific cooperation with the academies of sciences and other research organisations, the establishment of national committees and international research centres within the Academy, and broad collaboration with international and foreign scientific organisations. Other activities include the representation of Russian scientists at international scientific unions, participation in international organisations, international scientific congresses, conferences, symposia and seminars, international exhibitions, etc.

I.8.2.3 Regional Network / Cooperation

Of the overall 29,912 publications of Russian authors in scientific journals indexed in the Web of Science, 32.4% were made in co-authorship with foreign researchers (2008). The overall share of Russian researchers’ publications in the total volume of publications indexed in the Web of Science decreased from 3.99% in 1995 to 2.48% in 2008. The main Russian S&T partner countries 2004-2008 as per publication activity (co-authored papers) are the USA, Germany, France, the UK, Italy, Japan, Poland, Switzerland, Netherlands, Sweden, Spain, Canada, China and South Korea.

The Joint Institute for Nuclear Research (JINR) is an international intergovernmental scientific research organisation established through the Convention signed on 26 March, 1956 by eleven founding States and registered with the United Nations on 1 February, 1957. It is situated in Dubna not far from Moscow. The main fields of JINR’s activity are theoretical and experimental studies in elementary particle physics, nuclear physics, and condensed matter physics. There are seven Laboratories at JINR, each compatible with a large research institution when it comes to scientific activities. JINR staff totals about 5,000 people, including more than 1,200 scientists and 2,000 engineers and technicians.

JINR has a well established collaboration with CERN and GSI in a number of projects.

ISTC – the International Scientific and Technological Centre – is an intergovernmental organisation specially designed to discourage Soviet military scientists from leaving the country and conducting military research abroad. It is dedicated to the non-proliferation of weapons and technologies of mass destruction. ISTC was established at the beginning of the 1990s by an agreement between the European Union, Japan, the Russian Federation, and the United States of America. Armenia, Belarus, Georgia, Kazakhstan and the Kyrgyz Republic have also joined the ISTC. Norway acceded to the ISTC in 1997, the Republic of Korea in May 1998 and Tajikistan in March 2003. Canada became a full member of the ISTC in March 2004. The ISTC Secretariat Headquarters are located in Moscow. ISTC coordinates the efforts of numerous governments, international organisations and private sector organisations, providing weapons

146 ERA.Net RUS – FP7-226164, D 1.3 / Analytical report 3: “State of the art and perspectives of bilateral S&T programmes between EU MS/AC and Russia and of activities of S&T Programme Owners in EU MS/AC towards Russia and in Russia towards EU MS/AC accompanying / complementing bilateral S&T agreements”.


148 The Institute was established with the aim of uniting the efforts, scientific and material potentials of its Member States for investigations of the fundamental properties of matter. At present, JINR has eighteen Member States: Armenia, Azerbaijan, Belarus, Bulgaria, Cuba, the Czech Republic, Georgia, Kazakhstan, Democratic People’s Republic of Korea, Moldova, Mongolia, Poland, Romania, the Russian Federation, the Slovak Republic, Ukraine, Uzbekistan and Vietnam. Agreements are signed on the governmental level with Egypt, Germany, Hungary, Italy, Serbia and the Republic of South Africa. http://www.jinr.ru/

149 www.istc.ru
scientists from Russia and other EECA countries with market based opportunities to redirect their talents towards peaceful scientific research and innovation.

I.8.2.4 Partnership and Cooperation Agreements (PCA)
The EC-Russia Partnership and Cooperation Agreement (PCA) was concluded on 24 June, 1994. As the PCA expired in 2008, negotiations on a new agreement were launched at the June 2008 Summit between the EU and the Russian Federation. Following the Russia/Georgia conflict the EU postponed the second round. In 2003 four strategic cooperation directions named “Common Spaces” were launched within the PCA. They cover Economic Issues and the Environment; Freedom, Security and Justice; External Security; and Research and Education, including Cultural Aspects. The Common Space on Research, Education, and Culture includes strengthening Russia’s participation in the EU Framework Programme, implementation of the Bologna process in higher education in Russia and harmonisation of rules and regulations. A Permanent Partnership Council (PPC) has been established, which held its first meeting in May 2008.

The Agreement on Cooperation in Science and Technology between the European Community and the Government of the Russian Federation 194 was signed on 16 November 2000, entered into force on 10 May, 2001 and was renewed for another five years150 following the Council's decision on 30 March, 2009. The Agreement is a formal basis of cooperation in scientific and technological research between the EU and Russia in the following fields: Environment and Climate Research, including Earth Observation; Biomedical and Health Research; Agriculture, Forestry and Fisheries Research; Industrial and Production Technologies; Materials Research and Metrology; Non-nuclear Energy Transportation; Information Society Technologies; Social Sciences Research; Science and Technology Policy; and Training and Mobility of Scientists. A number of coordination mechanisms have been established to steer the EU-Russia S&T cooperation and to implement the Agreement. These include the joint EU-Russia S&T cooperation committee (S&T agreement steering body) and joint thematic EU-Russia working groups on most topics of the FP7: Nanotechnologies, Health, Food/Agriculture/Biotechnologies, Energy, Environment, Aeronautics, Space, Nuclear Energy Fission Research, ICT, Infrastructure and Mobility. The working groups involve representatives of the European Commission (Directorate General for Research and Innovation, Directorate for Education and Culture, Directorate General Enterprises), Federal Agencies, Russian ministries and scientists, Russian NCPs; on the EU side, these working groups are headed by directors in charge of the corresponding themes.

I.8.2.5 EU – European Neighbourhood Policy
To make the cooperation under the Fourth Common Space on Research and Education operational, two roadmaps have been developed (for the years 2009-2011 and 2010-2012). The roadmaps take stock of Russia’s participation in FP7 and coordinated calls. They cover technology platforms, EU-Russia working groups, project twinning schemes, NCP activities, initiatives of the European Research Council, Euratom-Russia CA, COST actions, EUREKA and the Joint Research Centre. They also include other EU, pan-European and international S&T programmes, involving Russia: ITER, ISTC, ISS, Eureka, CERN, as well as bilateral EC MS - Russia S&T activities.

Russia has been one of the target countries in the EU Northern Dimension initiatives. The European Neighbourhood and Partnership Instrument (ENPI) is the financial tool used to support Russia’s participation in this initiative. The total budget of ENPI is €1.181 billion of which around 10% is earmarked for regional projects. The application of ENPI to Russia signifies a move from technical assistance (TACIS) to a more equitable partnership, which previewed equal co-financing from the Russian side. The EU funds for Russia are used to support the implementation of the road maps for the four common spaces (thematic priority) and Kaliningrad Oblast (geographic priority). The National Indicative Programme for Russia for the years 2007-2010 amounted to €30 million per annum. Key elements of ENPI151 in Russia are as follows:

1) The national indicative programme, content of which is agreed annually with the Russian Government (National Coordination Unit in Ministry of Economic Development). With a budget of €30 m/year it contains programmes such as the IBPP and the Common Spaces Facility. The funding priorities are Four Common Spaces and Kaliningrad. The real budgets were much

smaller due to the inability of the Russian and the EU side to come to an agreement with regards to funded projects. Only a small part of the reserved €90 million for 2007-2009 was used. As a consequence, a 50% reduction in the new NIP allocation table was previewed for 2011-2013 (€15 million per annum).

In contrast to typical EU aid programming documents, the NIP for the Russian Federation does not identify specific priorities and indicators of achievement for the 2007-2010 programming period, because “the Russian side has rejected the idea of deciding in advance on the prioritisation of objectives.”

2) The interregional programme contains Erasmus Mundus External Cooperation Window, TEMPUS and TAIEX (SIGMA does not apply to Russia). Its priorities are the Fourth Common Space (Education) for Erasmus and TEMPUS and four Common Spaces.

3) The regional programme is developed centrally in Brussels and contains multi-country projects in the Eastern Europe Central Asia region (e.g. FLEG). Its priorities are defined on an ad hoc basis.

4) The Cross-border Cooperation (CBC) programme uses EU structural funds and external cooperation budget pooled with single procedures. Russia benefits from seven programmes: Kolactic, Karelia, SE Finland, Est-Lat-Rus, Lit-Pol-Rus, Baltic and Black Sea (the last two no longer available for Russia). The programme priorities are Common Spaces and the Northern Dimension.

I.8.2.6 National and Bilateral Programmes

- Resolution No. 220 of the Government of the Russian Federation on the provision of monetary grants to support scientific research activities implemented under the supervision of leading scientists at Russian institutions of higher education approved on April 9, 2010. Programme funds will be available through a competitive grant process. “Grant stipends will be offered in amounts of up to 150 million RUB for each research project in 2010-2012, with opportunities to extend the research period for 1-2 years,” according to an official government release. Competitions are held on an annual basis. Start date: 2010, end date: 2012.

- Russian Foundation for Basic Research has joint agreements and calls with DFG, CNRS, NSFC, BRFBR, NSF/CRDF, INTAS-RFBR 1997, OAD, and CAE.
- The Russian Foundation for Humanities’ (RFH) strategy for international cooperation focuses on three target groups: post-USSR countries, European countries, and the countries that traditionally have close relations with the USSR (Mongolia, China, Vietnam, and Taiwan). RFH has established contacts with S&T funding organisations in EU countries (Finland, Germany, and France) in order to organise the joint support of research projects and to exchange experience in research funding.

I.8.2.7 EU Framework Programme for Research and Technological Development

The majority of the NCP host organisations were nominated by Decree from the Ministry of Education and Science of the Russian Federation from 21 February, 2007. The decree was issued in line with the implementation of the Road Map for the Common Space of Research and Education.

In general, selected NCP host institutions are well known and rather acclaimed Russian RTD institutions, RTD funding organisations and universities well embedded into the RTD community of the respective thematic area of the Framework Programme. The type of institution varies from small institutes with 25 – 30 employees to large research institutes and higher education institutions with several thousand employees.

According to the 2011 Decree, three ministerial departments are responsible for the Russian NCP system: Department of External Integration, Department of International Cooperation and Department of Prior-

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ity S&T Areas. NCPs' annual reports and requests for funding (subsidies) are also formalised in the decree. Yet, there are neither clear rules nor a timeline for government funding of NCP activity.

Cooperation with the EU is strengthened within the FP7, especially through coordinated calls between the EC and Russia in thematic priorities of the Specific Programme “Cooperation.” In these calls, the EC and Russia jointly define specific topics in the frame of a standard call of the cooperation programme. The Russian participants in selected projects will then be funded by the Russian federal budget. Such coordinated calls and topics have been agreed upon in the following areas: Food, Agriculture and Biotechnology, Energy, Health, Nanotechnology and New Materials. Discussions on coordinated calls are ongoing for Aeronautics, Nuclear Fission and Space Research. The specific topics of the call are agreed among Russian and EU experts in joint working groups, involving representatives of the Commission and Russian ministries. Working groups are currently running for the FP specific programmes: Nanotechnologies, Health, Food/Agriculture/Biotechnologies, Sustainable Energy, Aeronautics, Space, Nuclear Energy Fission Research, Environment, ICT, Infrastructures and Mobility.

Russian organisations were the most active participants in FP7 not only in the EECA region, but also worldwide. In 2010 a significant increase in the number of applications (approximately half of applications) was noted. The greatest share of participants from EECA countries are organisations from Russia – in the case of applications 57.38% and in the case of successful applications – 59.08%. The biggest number of successful Russian participation is in the Transport Programme.

I.8.2.8 Lifelong Learning Programme
Russia is eligible to participate in a number of LLL activities: Erasmus Mundus, Youth in Action, TEMPUS and Marie Curie Actions. 2009 and 2010 were consolidation years for the Key Activity Languages (KA2) and it is now a common feature in this Key Activity to support projects targeting languages such as Russian154.

Currently, the European Commission is funding more than 100 Erasmus Mundus master's courses and since 2004 more than 340 Russian students have been selected to study on Erasmus Mundus master's degree programmes in Europe. Seventy Russian students were selected to study on Erasmus Mundus master's courses from September 2010.

Russian students currently studying at a Russian higher education institution on a Bachelor, specialist, master’s or PhD degree programme can obtain a scholarship to study for at least one semester in a European university. This type of mobility requires that Russian and European universities form a consortium and apply to the European Commission for funding. If funding from the European Commission is granted, the consortium of Russian and European universities select bachelor, specialist, master's and PhD students to study at the European partner university. At present, the European Commission is funding two consortia of Russian and European universities. More than 700 Russian students (bachelors, specialists, master’s and PhD) have obtained the chance to study in Europe. More information about the two consortia is available at the following websites:
1. http://www.iamonet.de/

Russia joined the Bologna process in 2003. The EU-Russia cooperation in the sphere of higher education include facilitating links between Russian and European universities; encouraging awards for joint or double diplomas; establishing quality monitoring systems for Russian curricula and institutions, as well as internal university quality-control systems; supporting Russian participation in the Erasmus Mundus programme; promoting EU studies in Russia (including training for government officials and post-graduate students and the establishment of the European Studies Institute at MGIMO); and promoting the study of Russia and the Russian language in the EU, as well as the study of the EU and European languages in Russia155.

I.8.3 Challenges
Business contributes little to national expenditure on R&D. In Russia the business enterprise expenditure for R&D (BERD) fluctuates around 30% (28.7% in 2008)156. Production enterprises perform relatively little in-house R&D.

156 Science Indicators. 2010. Statistical Databook. Higher School of Economics, Moscow.
To stimulate business involvement in R&D, anti-crisis financial support to enterprises depended on fulfilling the mandatory requirement of increasing production efficiency, as well as adopting an innovation-based development programme (including such measures as increased energy-efficiency, introduction of innovative products, and application of modern technologies in industrial production). Similar requirements were introduced for large enterprises, partially or fully owned by the state, and ‘natural monopolies.’ The requirements for innovation-based development programmes of state-owned companies include undertaking an independent and comprehensive technology audit, building the innovation infrastructure and assuring cooperation with universities, research units and SMEs. Moreover, these companies are encouraged to participate in technology platforms (TP). In April 2011 a similar number of platforms were created in Russia. The governmental commission on high technology and innovations approved the list of twenty two TPs and seven more were placed in the pipeline for merger and further engineering157.

In April 2010 the Russian Government adopted Decree No. 218 “On measures of state support for cooperation among Russian higher education institutions and organisations, implementing comprehensive projects aimed at the creation of high-tech production.” The decree was adopted with a view to stimulate R&D cooperation between Russian universities and enterprises and to stimulate knowledge intensive economic activity158.

According to data provided by the Ministry of Science, the loss of one scientist costs the country an estimated $300,000. Over 10 years (1990-2000), some 16,000 Russian scientists have obtained permanent foreign work contracts and left the country. Although the rate was higher in the early 1990s – 2,000 a year - it is still high, amounting to 1,000 emigrating annually. Only about 20 percent of those professionals have returned159. The number of researchers who emigrated totals 1% in average. If we add the high school teachers, engineers, top managers of enterprises and students, the flow of emigration from Russia to some countries will exceed 20%. In general, the total share of highly qualified people emigrating from Russia is equal to 20%160.

In order to encourage the development of the scientific potential in Russia and prevent the brain drain of scientists, the George Soros CEU Foundation introduced reintegration grants for research in Russia in 1990s: scientists, who received fellowships for a one- to two-year research in the West, were offered one year grants up to $25,000 for research to be conducted in Russia.

To prevent the brain drain, the Russian Government adopted in 2010 the Decree No. 220 “On measures of attraction of leading scientists to Russian educational institutions of higher professional education.” The open public contest for grants from the Government for state support of scientific research which is carried out under the guidance of leading scientists in Russian universities was announced in June 2010. There were 507 applications from leading scientists together with 179 educational institutions of higher professional education (universities can participate in several projects with various scientists). Among 507 leading scientists, 291 are Russian Federation citizens (of whom seventy-three are working abroad), ten scientists are citizens of countries that are members of the Commonwealth of Independent States, 169 scientists of other foreign countries, and thirty-seven people have dual citizenship. The expertise of each application was maintained with equal participation of Russian and international experts. In case of considerable difference in the results of the expertise, the application could be sent for additional expert evaluation by the contest commission. Building on the success of the competition, a repeated call was opened in 2011161.

The biggest challenge for the country and its modernization is the necessity to take into account both the enormous changes in the political and economic context which occurred after the collapse of the Soviet Union, as well as important constraints imposed by the legacy of the past. The pending radical transformation should thus face institutional and personal resistance. For example, today’s Russian policy admits the “coexistence of increasingly prevalent market-oriented mechanisms for the allocation of economic resources with others that are more socio-politically network-based.” Furthermore, “there is a sharp contrast between progressive territorial, scientific, tech-

158 http://www.p218.ru/
161 http://eng.mon.gov.ru/pro/ved/uch/
nological and industrial nodes of excellence and a rather large stagnant pool of firms and organisations with very low productivity and little innovation.”

The effects of the 2008-2009 financial and economic crises were noticeable for the Russian R&D sector. They aggravated the previously existing problems, such as a low level of innovative products (goods and services) sales of Russian enterprises (fell by 4.1% constant prices in 2008) and a decrease of R&D performing personnel (fell by 5% in 2008). Although GERD fell by 1.6% (in constant prices, 2008), mostly due to lower business R&D expenditure, budgetary appropriations on R&D substituted for this gap and grew by 3.5%.

The Russian Government continues its policy aimed at a new quality of economic growth - innovation-based economic growth. The latest policy mix employed by the Government are renewed priorities for technological modernization, creation of Russian technological platforms, introduction of innovation programmes for state-owned enterprises, financial support to research universities, stimulating the linkages between enterprises and universities, support to the existing pilot national research centres – Kurchatov Institute – and creation of new centres.

Restructuring the S&T system is a prerequisite for fulfilling the key goal of technology-based modernization for the economy. In order to absorb the increasing GERD and budget appropriations for R&D, the Russian S&T system has to raise its efficiency as measured by production outputs. The current outputs (patents, publications, innovation activity) remain rather low. Other existing difficulties of the Russian S&T and innovation system are weak framework conditions for innovation and low level of private sector contribution to GERD. This is reflected in low high-tech exports and low innovation activity of enterprises.

Although the number of R&D personnel employed fell sharply during the 1990s, many research organisations managed to survive, often at a very basic level. Some organisations have been transformed into joint-stock companies while remaining government-owned and government-funded – for example, in the form of block grants from ministries or as contract research and design – work from other, production-oriented, state-owned enterprises.

As underlined in the OECD Innovation Review, “RAS remains a glorious learned society but uses its well deserved prestige to resist the need to improve the efficiency of its management,” which represents a threat to the overall national S&T system. On the other hand, “improved balance between cooperation and competition among the different components of the public research system” is one of the strengths. This includes an increased share of competitive funding in the RAS budget.

At the same time, the marked difference between Russia and the other BRICS countries is that the share of GERD allocated by the higher education science sector is rather low at 6.7% (2007/2008), as compared to 38.4% in Brazil, 20% in South Africa and 35% in Canada. Many innovative economies are characterised by large-scale applied university research matched against the private sector demand.

The Russian Federation has one of the highest proportions of science and engineering graduates in the world, which is well above the OECD average. It also has very high rates of university admission. Furthermore, like other areas, higher education was not immune from the austerity of the transition years and has suffered some degradation in facilities and services, particularly in the regions. Curricula in many departments are also in need of updating in order to better reflect the labour market’s demand for skills. This includes innovation management skills and initiatives that will nurture an entrepreneurial spirit among graduates.

I.9 Country Report Tajikistan

I.9.1 Current State of S&T & Major Policy Challenges

I.9.1.1 S&T Indicators

TABLE 16: S&T LANDSCAPE 2010

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
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<tbody>
<tr>
<td>0.06</td>
<td>67</td>
<td>5,617</td>
</tr>
</tbody>
</table>

I.9.1.2 Research Structure and Policy

The government of Tajikistan has recently adopted a number of science-related Laws, for instance, the Law on Science and National S&T Policy in 1998, the Law on the Academy of Sciences of the Republic of Tajikistan in 2002, and a Decree on the Activities of the Academy of Sciences in 2004. A number of decrees have also been adopted to cover the fields of academic accreditation of research organisations and scientific personnel and to establish national scientific committees, as well as to protect intellectual property. In 2004 two laws were passed On Invention and On Industrial Samples, respectively. These were followed in December 2006 by a Law on Rights Protection for the Topology of Integrated Microcircuits then, in March 2007, by a Law on Trademarks and Service Marks and a second Law on Geographical Indicators\(^{166}\). Also, in 2003 a decree establishing the National Plan of Development of Basic Research in Tajikistan for 2005-2008 was adopted.

The current National Development Strategy of Tajikistan 2007-2015 which includes the Science Development Strategy, foresees updating the legislative basis of S&T and finding measures to ensure its proper execution. In this Strategy, science is described as a national priority. The Strategy also aims at further strengthening the collaboration between Tajik research organisations and the different Ministries, and outlines an ambitious programme for developing scientific cooperation with other countries, including fellow members of the CIS, as well as with international organizations, via intergovernmental agreements and partnerships to be concluded by the Academy of Sciences, research institutes and universities.\(^{167}\)

Tajikistan’s Science Development Strategy identifies several weaknesses in the national S&T system such as lack of funding and insufficient research infrastructures, many of which were destroyed during the years of the civil war in 1992-1997. The Strategy underlines the need to build sufficient information infrastructure improving the institutes’ connection to modern information technologies and making additional scientific literature available in libraries. There is also a lack of highly educated scientific staff, a fact related to the very low financing of the research sector. To improve the situation, Tajikistan wants to better integrate its higher education and S&T systems. Moreover, the Strategy points out the need to establish national comprehensive S&T programmes that would tackle important scientific and socio-economic problems of the country. It also refers to insufficient international research collaboration despite the relatively high number of signed bilateral S&T agreements (see below).

Overall, the Strategy determines the following national priority fields that should contribute to the socio-economic development of the country:

- socio-economic policy;
- hydro energy and complex use of Tajikistan water resources, renewable energy resources and new energy technologies;
- mineral and raw materials industry, new materials and modern chemical technologies;
- agro-industrial complex, food safety;
- health and ecological safety;
- information and communication technologies;
- education\(^{168}\).

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166 / 167 UNESCO Science Report 2010
I.9.1.3 Important Research Organizations
At the moment the Academy of Sciences of the Republic of Tajikistan is the country’s main scientific centre with important decision making power in the national S&T policy. The majority of research organisations are concentrated under the Academy of Sciences, the Academy of Agricultural Sciences and the Academy of Educational Sciences. In addition, there are a few research institutes and universities that do not belong to the structure of the Academies.

I.9.2 Current Trends & Challenges in International Cooperation

I.9.2.1 National Policies
On 15 April 2011, the Science Development Strategy of Tajikistan for 2011-2015 was presented in Dushanbe. The strategy foresees more active international collaboration and an increase of foreign funding in S&T up to 20% by 2015 although it does not state what the incentives will be for an enhanced collaboration (see above).

I.9.2.2 Bilateral Agreements
Tajikistan has signed only four bilateral S&T agreements with EU MS/AC such as Austria, France, Germany and Turkey. Besides government level agreements, bilateral collaboration has been established at the NAS and university level. The Academy of Sciences maintains the widest international connections with scientific centres in foreign countries. According to the decision of Council Government Heads of CIS and with the purpose of further expanding integration processes in the field of science, the Academy of Sciences accepts the most active participation in elaboration and realization of Conventions and Agreements within the framework of the Interstate Integration Committee.

I.9.2.3 Regional Network / Cooperation
The main collaboration partner in international programmes and co-authored publications is Russia, followed by the neighbouring countries of Uzbekistan and Kazakhstan. The EU Member States and Associated Countries are represented to a much lesser extent. Tajikistan bilateral research collaboration is more oriented towards the region of Central Asia and its neighbouring countries, such as Afghanistan, China, Iran, Pakistan and India but also the USA rather than towards Europe.

I.9.2.4 EU - Central Asia Strategy
The common goal of achieving stability and prosperity by means of peaceful interaction makes Europe and Central Asia partners for increased cooperation. The European Commission's Delegation in Tajikistan has a substantial programme of operations, with a staff of twenty-four and an appointed resident Ambassador/Head of Delegation. The government's major economic priority is the completion of the Rogun dam, for which it would welcome a consortium of international investors. While this project is extremely ambitious, it needs the support of the EU since it offers opportunities for economic advancement – together with regional links to South Asia – which could become part of a post-war regional economic recovery.

I.9.2.5 Partnership and Cooperation Agreements (PCAs)
A Partnership and Cooperation Agreement (PCA) between the EU and Tajikistan was signed in October 2004 and it was ratified in 2010. PCA provides a framework for policy dialogue and also the basis for cooperation in the scientific field. The EC assistance to Tajikistan focuses on rural development and poverty reduction, agriculture and land reform, promotion of good governance and economic reforms.

The Co-operation Committee between the European Union and the Republic of Tajikistan held its first meeting in March 2011. The EU assistance under the Regional Strategy 2011-13 for Tajikistan amounts to €62 million and focuses on social sector reforms in Health and Social Protection, support to Private Sector Development with a particular focus on agriculture, and strengthening Public Administration and Public Finance Management.

I.9.2.6 EU Framework Programme for Research and Technological Development
The Tajikistan National Information Point (NIP) for EU Framework Programmes was established in 2004. It is a non-governmental institution Society for Development of Scientific Cooperation (SODESCO).

Three Tajikistan research organisations participate in FP7 projects (out of six applications). The total EC contribution amounts to €136.5 thousand. In comparison to the FP6 the Tajik participation in the FP has decreased (five Tajikistan research organisations participated in FP6 projects).
I.9.2.7 Development Co-operation Instrument (DCI)
The EU has assisted the countries in this region since their independence to help them achieve the radical reforms needed. Assistance has been significantly increased over the last years to help strengthen and deepen relationships with Central Asia. Tajikistan is the poorest country in the region and, therefore, benefits from the highest level of development assistance. The DCI work programmes include S&T aspects for research with particular focus on social and economic needs. From 1996 to 2006, a sum of €39.5 million was committed to the food security programme in Tajikistan. The main part of this assistance was in the form of budget support for a reform programme in agriculture and social protection.

I.9.2.8 Lifelong Learning Programme (LLL)
Tajikistan is not involved in Comenius, Erasmus, Leonardo da Vinci and Grundtvig programmes. The TEMPUS Programme was opened to Tajikistan in 2004. Actively involved in TEMPUS higher education institutions are the Tajik Technological University, Tajik State University of Commerce, Tajik Pedagogical University, Tajik Technical University as well as the Tajik Agrarian University. Regarding the participation in ERASMUS MUNDUS 2011, twenty-four Tajik students applied for grants and took part in the scholarships selection.

I.9.2.9 Further Activities
Tajikistan is also supported by EU programmes at a national level with the amount of €66 million. The priority areas are: 169
- Poverty reduction and increasing living standards
- Regional and local community development
- Sector reform in rural development and social sectors
- Good governance and economic reform
- Democratic development and good governance (promoting civil society, social dialogue and democratic processes, judicial reform and rule of law, improving public administration and public finance management)
- Implementation of trade and market regulatory reforms, and administrative capacity building

I.9.3 Challenges
The after effects of the collapse of the Soviet Union in 1991 and the civil war 1992-1997 still challenge the development of the Tajik S&T landscape. Both events have disrupted Tajikistan’s former regional links and isolated the scientific community. Furthermore, the transboundary cooperation in particular in the field of water and energy management is politically very sensitive.

Because of low governmental investment and funding in science, modernization of the S&T landscape has not reached its full potential yet. Also, the private sector does not invest in science. The relationship between the private sector and the S&T activities in the country can be considered as non-existing and therefore leading to a weak innovation and knowledge transfer system.

Although technical assistance programmes are numerous, the technical equipment of the laboratories and other research facilities are not up to date. The same is true for methodologies (teaching, analyses, technology and information transfer) which still follow the Soviet procedures and do not comply with international standards.

The standard scientific language is still Russian due to the strong academic links with Russia, e.g. all graduate students still receive their PhD title from Russia. Therefore a very small share of scientists speaks sufficient English. This hinders Tajik scientists from participating in international conferences and events. Furthermore, international travel is seldom funded by the national research institutions. This reduces scientific mobility substantially.

The underfinanced research sector cannot offer attractive positions for young scientists so many of the highly qualified leave for other jobs and for other countries e.g. Russia, USA. The bureaucratic research structure and the brain drain have created a generation gap in most of the scientific areas and organisations.

Access to international S&T information, networking with European scientist and EU project management skills have only started to develop. Furthermore, the current financial, banking and customs system make the implementation of the common project difficult.

I.10 Country report Turkmenistan

I.10.1 Current State of S&T and Major Policy Challenges

I.10.1.1 S&T Indicators

TABLE 17: S&T LANDSCAPE 2010

<table>
<thead>
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<th>Number of researchers</th>
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<tbody>
<tr>
<td>n/a</td>
<td>46(^{170})</td>
<td>3,689(^{171})</td>
</tr>
</tbody>
</table>

I.10.1.2 Research Structure and Policy

The development of science is of important significance to the state of Turkmenistan. Since the first days of his election to head of state, President Gurbanguly Berdymukhammedov has been paying attention to the scientific, technological and innovative development. Initiated by the President, stable legal grounds have been set up in the country for free scientific creativity and the guarantees for scientific activity are fixed in item 39 of the Constitution of Turkmenistan, a new edition of which was adopted in September 2009. The constitution sets the right of the citizens in Turkmenistan for free scientific activity. The regulation of rights and guarantees of scientific activity is reflected in the law “On Status of the Scientific Researchers in Turkmenistan” that was adopted in August 2009. The law considerably expands the rights of scientific researchers and creates possibilities for free research creativity. For instance, one of the rights of scientific researchers with a Doctor of Sciences degree is to have a vacation of forty-five calendar days while of those with a Candidate of Sciences degree thirty-six calendar days. Great attention is paid to scientific staff at the beginning of their career. An example of this is the provision of the law that foresees research grants to applicants of the postgraduate and doctoral candidacy courses as well as, in line with item 8 of the law, the right to get additional literature in a two-month research grant. Stable legal grounds regarding the activity of scientific researchers set the basis for creative intellectual work by scientists and researchers, and the scientific development and the expansion of cooperation between scientists and young researchers.

Fundamental principles of the state policy formation of the country in the area of science and priorities in scientific research have been formulated\(^{172}\).

The head of the government marked out the priority areas as follows:

- complex use of natural resources, extraction of mineral resources, petro-chemistry, gas and mineral resources processing;
- electric power engineering, study and wide use of alternative energy sources (solar, wind, geothermal waters, biogas etc);
- textile industry;
- seismology, city planning and architecture;
- transport and communication, development of information systems and communication;
- product automation;
- introduction of ecologically clean and non-waste technology;
- environmental health, favourable impact on climate conditions;
- development of agricultural and industrial complex, rational use of land and water, selection work, selection of new sorts of crops, including increase of yield based on scientific evidence, com-

\(^{170}\) calculated
\(^{171}\) Statistical Yearbook of Turkmenistan, Ashgabat, 2010, p.160
\(^{172}\) Meeting of the Cabinet of Ministers of Turkmenistan on June12, 2009, “Neutral Turkmenistan” June13, 2009
prehensive organisation of greenhouses;

• improvement of territorial allocation of production;

• efficient use of material and labour resources in the national economy;

• medicine (prevention and treatment), pharmacy;

• the Sciences;

• the Humanities and, specifically: study and development of the Turkmen language; study and development of classics in Turkmen literature and the heritage of Turkmen philosophers of the past; popularisation of their creation works; conservation and study of archaeological monuments; study of ancient, medieval, new and modern history of Turkmenistan; folklore and culture of the Turkmen people; creative rethinking and scientific development of problems of the modern epoch; and new state ideology of Turkmenistan.

Respective tasks were identified for each branch of science. In order to ensure the economic development of the country and to restructure industry, the most important role belongs to fundamental science, the research of which should be directed to the solution of issues to form new technological aspects of industrial branches based on the wide implementation of high technologies: nanotechnologies, know-how, latest achievements of fundamental sciences and improvement solutions.

Great attention is paid to the support of scientific and research activity of the youth. According to the Presidential Decree 8 April, 2002, a contest for young scientists has been arranged in different branches of research studies. Eligible for participation are young people under the age of thirty-seven who work or are students and who are inclined towards scientific and research activity. The results of the research performed are summed up on an annual basis and the winners are awarded with valuable prizes and gifts. The awards are granted to the winners in the presence of government members. In 2011, sixty winners of the contest received valuable prizes, among them post graduates, teachers and students.

Turkmenistan constantly supports the professional training of young scientists and their scientific creative activity. Clinical studies, postgraduate courses and the institution of doctoral candidacy have been restored, and as a result, application processes by young people who want to pursue a career in science and scientific research have been formulated which has added inspiration and impulse to the scientific research activity of the youth.

I.10.1.3 Important Research Organisations

The Academy of Sciences was set up in the country and heads all activities regarding the development and organisation of science in Turkmenistan.

According to the reform, eleven institutes and the library moved under the Academy of Sciences and are funded from the budget, while two subdivisions in the institutes as well as the editorial staff and the publishing house “Ylym” are funded on a self-financing basis.

The major functions of the Academy are: implementation of the scientific and technical policy of the state; projection of scientific, engineering and technological development and identification of the priorities in their advancement; efficient increase of scientific and research studies; implementation into production of international scientific and national achievements and other functions. The Academy of Sciences as the major scientific and research centre is also responsible for the important tasks of the coordination of scientific and research activities of higher educational institutions and branch scientific and research institutes.

There are twenty-two higher educational institutions in Turkmenistan, among them the following: Turkmen State University after Makhtumkuly, Turkmen Agricultural University after S.A. Niyazov; International Turkmen-Turkish University and Turkmen State Medical University.

Three educational academies: Academy of Civil Servants under the President of Turkmenistan, Academy of Arts and Academy of Police.

Institutes: Institute of International Relations; the Military Institute; Military and Sea Institute; Institute of Culture; Institute of World Languages; Institute

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173 Decree of the President of Turkmenistan of January 14, 2008

174 The Decree of the President of Turkmenistan 10458 of 12 June, 2009 “On Issues of the Academy of Sciences of Turkmenistan”
of Economy and Management; Institute of Transport and Communications; Institute of Physical Culture, Sport and Tourism; National Conservatory; Pedagogical Institute; Polytechnic Institute; Energy Institute; Branch of Moscow Institute of Oil and Gas after Gubkin; and Agricultural Institute.

Scientific research is conducted in the higher educational institutions within the framework of social and humanitarian issues, as well as in the area of fundamental and technical sciences in the Institute of Transport and Communications, Polytechnic and Energy Institutes and the State University.

Branch research centres conduct large research work and science development. These are:

- In the area of building state, democracy and human rights: National Institute of Democracy and Human Rights at the President of Turkmenistan; Institute of State and Law of Turkmenistan;
- In the area of economy: Institute of Strategic Planning and Economic Development;
- In the area of library science, maintenance and transfer of information: National Library of Turkmenistan after S.A. Niyazov;
- In the area of environment protection and climate change: Institute of Deserts, Flora and Fauna of the Ministry of Nature Protection;
- In the area of water resources: Institute Turkmen Suwylymtaslama of the Ministry of Water Resources;
- In the area of medicine: Research and Clinical Centre of Mother and Child after Gurbansoltaneje; Research and Clinical Centre of Oncology of Turkmenistan; Research and Clinical Centre of Eye Diseases;
- In the area of oil and gas: Institute “Nebitgazlymtaslama” of the State Concern Turkmengas;
- In the area of geology: Scientific and Research Geological Exploration Institute of the Ministry of Oil and Gas Industry and Mineral Resources;
- In the area of agriculture: Scientific and Research Institute of Land Development; Scientific and Research Institute of Cotton Growing; Scientific and Research Institute of Cattle Breeding and Veterinary Science.

Resulting from the set up of the legal grounds allowing scientific research and development in the private structures and by individual researchers, private consulting companies began to set up in Turkmenistan that also develop scientific and research studies and contribute to the development of science.

I.10.2 Current Trends & Challenges in International Cooperation

I.10.2.1 National Policies

Expansion of the international cooperation plays an important role in scientific development in Turkmenistan. International cooperation focuses on three main aspects: a) wide/useful contacts; b) exchange of experience between Turkmen scientists and teachers, and their foreign colleagues and c) facilitation of the international cooperation in the area of science and technology.

To implement the marked areas in the expansion of cooperation, there is a legal basis in Turkmenistan which is regularly enhanced with new laws. Thus, new laws have been adopted such as the Laws of Turkmenistan “On Scientific and Technological Policy” and “On Scientific Intellectual Property” that exist in the country since 1992. These laws considerably expand the legal grounds of international contacts and cooperation. For instance, an important step in this area is the Law of Turkmenistan “On the Status of the Scientist in Turkmenistan” that was adopted in August 2009. The law sets the legal basis for the training of scientific researchers on postgraduate courses, (postgraduate/advanced students), of those who work at a military academy/college, or who are in the process of seeking national scientific centres, but also for foreign research centres. The law also sets the legal basis and has a significant influence on the expansion of cooperation between Turkmen scientists and their foreign colleagues and from the very beginning of the careers of young scientists, which is important in establishing stable long term contacts with scientists from foreign countries.

I.10.2.2 Partnership and Cooperation Agreements (PCAs)

Turkmenistan has signed over thirty agreements on scientific and technological cooperation with countries from different regions of the world. Most of them are CIS states, scientific contacts and collaboration, which are the basis for bilateral agreements. At the initiative of the President of the country to expand the S&T international cooperation, the number of relevant agreements grows annually.

A considerable package of agreements for cooperation in the area of science and technology has been signed with neighbouring Kazakhstan since independence. Thus, three agreements related to the issues of scientific and technological cooperation and training of scientific/pedagogical staff were immediately
signed and came into force in Almaty on 27 February, 1997. These are:

- The Agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on cooperation in the area of training and certification of scientific and scientific/pedagogical staff of the highest level of proficiency;
- The agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on cooperation in the area of science and technologies;
- The agreement between the Government of the Republic of Kazakhstan and the Government of Turkmenistan on cooperation in the area of education;
- On 5 July, 2001 this list was enhanced by the agreement between the Government of the Republic Kazakhstan and the Government of Turkmenistan on mutual acceptance of documents on education, scientific degrees and ranks.

The list of available agreements was expanded by the new contract between the Republic of Kazakhstan and Turkmenistan on trade-economic, scientific-technological and cultural cooperation till 2020, signed by the governments of both countries in Astana on 28 May, 2007 and ratified by Mejlis of Turkmenistan on 28 December, 2007. The programme is attached to the contract between Kazakhstan and Turkmenistan until 2020 in which priorities of the scientific-technological cooperation are defined *inter alia*.

Ukraine acts as an important partner in the area of scientific and technological cooperation with Turkmenistan. Bilateral cooperation has been activated after having signed the agreement between the Cabinet of Ukraine and the Government of Turkmenistan on mutual acceptance of documents on education, scientific (academic) degrees and academic ranks in 2001. In the area of scientific-technological cooperation, relations have begun to develop on the level of subjects of administrative-territorial divisions. Thus, on 22-23 March, 2005, the agreements between Donetsk regional administration and Khakimlik (local authorities) of the Balkan province of Turkmenistan were signed on trade-economic, scientific-technological and humanitarian cooperation, among others, which testify the expansion of contacts and cooperation in the area of science and technology.

Since 2009, scientific and technological cooperation with the Republic of Belarus has begun to develop. On 18-19 June, 2009, during the visit by the President of the Republic of Belarus to Turkmenistan, the agreement between the Government of the Republic of Belarus and the Government of Turkmenistan on cooperation in the area of science and technologies was signed among other agreements. In addition, during the return visit of the President of Turkmenistan Gurbanguly Berdymuhamedov to the Republic of Belarus on 25-26 January, 2010, the agreement between the Government of Republic of Belarus and the Government of Turkmenistan on mutual acceptance of documents on education, scientific degrees and ranks was signed, thus creating a wide range of possibilities for scientific networking between the two countries.

A large number of agreements, including the agreement on trade-economic, scientific-technological and cultural cooperation, were signed with Russia in July 2007 and facilitated the activation of contacts in the area of education for the coming years, and also cooperation in the area of science and technologies. Since 2010 scientific and technological cooperation has received further development on a level of subjects with the Russian Federation; furthermore, the Agreement on Cultural and Scientific-Technological Cooperation with Tatarstan was concluded.

The Agreement on Scientific and Technological Cooperation with Uzbekistan was concluded on 22 February, 2010.

The push towards the development of scientific and technological cooperation with the European Union was made during the meeting of the President of Turkmenistan, Gurbanguly Berdymuhamedov and the Chairman of the European Union, Zhoze Manuelja Barrozu on 15 January, 2011 when the President of the country noted that the important direction of cooperation is the expansion of scientific contacts and professional training in the area of science and technology.

**I.10.2.3 Regional Network / Cooperation**

At present, SCC “Altyn Umyt” is the partner responsible for the implementation of the project IncoNet CA/SC in Turkmenistan. The project with a consortium of twenty-eight partners from Turkmenistan and the EU, aims to prepare the ground for a joint transfer of academic results to national, regional and worldwide markets by sharing their strengths and resources. Recently, the Academy of Sciences of Turkmenistan has become a partner in the project “Policy Dialogue in ICT to an Upper Level for Reinforced EU-EECA
Cooperation” where France acts as the main partner.

In the country, except for the national scientific magazines such as “Science and Technology in Turkmenistan,” “Economy of the Golden Age,” “Heritage” and others, the international magazine “Problem of Deserts Development” is available as well, and both scientists and researchers from other countries publish together with Turkmen scientists research results.

Since 1 July, 2010 the project of the European Commission, CAREN (Central Asia Research and Education Network) started in Turkmenistan and has provided an Education Research Network with high-speed Internet access of 34 mb/s.

The CAREN project also promotes the further strengthening of education research connections of the Central Asia region with Europe. It has started to produce a positive outcome in developing the educational and scientific spheres of the Central Asian region as a whole, as it allows scientists of these countries to cooperate actively with European colleagues, and provides access to scientific and educational resources of the European Education Research Network (GEANT).

I.10.2.4 EU - Central Asia Strategy
The main objectives of international cooperation for the country are to carry out research work and obtain scientific achievements in areas such as: renewable energy sources; rational use of water resources; conservation of the environment and climate change; information-communication technologies in education; sciences and medicine (distance learning, and telemedicine etc); social and economic research aiming at finding scientifically-justified solutions for the country’s development programmes. In addition, special emphasis is placed upon priority areas for the country such as the training of scientific staff that can apply modern research methods and make use of the latest technologies, the exchange of scientists, the improvement of the mobility of scientists through various training programmes, master’s degrees and doctoral programmes.

I.10.2.5 National and bilateral programmes
- A list of priority directions of science and technologies in Turkmenistan and directions of performance for research works on them for 2011-2015. Approved by the Decree of the President of Turkmenistan No. 11454 from 10 January, 2011. Start: January 2011, execution period: 2015;

I.10.2.6 EU Framework Programme for Research and Technological Development
Currently, there is no NCP system in place; however preparations are being made for its implementation.

I.10.3 Challenges
There are certain difficulties regarding the development of international cooperation, which need to be overcome step by step. There are no obstacles in the way of the expansion of international cooperation at the political level: the governments conclude all necessary agreements and contracts, accept programmes in priority directions and legal acts for scientific cooperation and decisions on research financing. There are however certain barriers in interaction regarding the expansion of the cooperation between the scientists of Turkmenistan and the European Union. The scientific community in the country does not completely possess information on research programmes from the European Union, and is not aware of the rules concerning document submission and the choice of topics and consortia. Applications submitted by Turkmenistan research centres are mostly rejected by evaluation commissions. One of the ways to develop international partnership in the area of scientific research is a wider cooperation in the drawing up of joint projects and applications.

In Turkmenistan, the legal basis to involve private research centres in scientific cooperation has been created. The participation in the SCC project IncoNet CA/SC testifies to the involvement of the private structures into the international scientific community. However, expansion of such participation will depend on the financial abilities of these private structures as their activities are based on self-financing.
I.11 Country Report Ukraine

I.11.1 Current State of S&T and Major Policy Challenges

I.11.1.1 S&T Indicators

TABLE 18: S&T LANDSCAPE 2010-2011

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.82</td>
<td>1,303</td>
<td>89,600</td>
</tr>
</tbody>
</table>

I.11.1.2 Research Structure and Policy

Ukraine has continued to update its research policy with more direct and sustainable economic development objectives. The country has implemented extensive scientific and technological cooperation with the countries of the world, to raise the quality of the national scientific research and technologies that are produced as well as to integrate the Ukrainian scientific potential into the European and international research areas. The foreign policy of Ukraine aims to ensure support of Ukrainian science, culture and education and to safeguard the intellectual potential as well as the equal development in all fields of the Ukrainian culture, to accelerate the national renaissance and the development of free cultural and humanitarian exchange with the countries of the world.

The legal basis of the S&T policy is composed from the Constitution of Ukraine and the following Laws of Ukraine: “On Science and Scientific and Technological Activities” (adopted in 1991, last amendments introduced in 2011); “On the Public Forecasting and Development of the Economic and Social Development Programmes of Ukraine” (adopted in 2000); “On Priorities of Science and Technology Development” (adopted in 2001, last amendments introduced in 2010); “On Science and Scientific & Technological Examination” (adopted in 1995, last amendments introduced in 2006); “On Scientific and Technological Information” (adopted in 1993, last amendments introduced in 2011); “On the Legal Specifics of the Functioning of the National Academy of Sciences of Ukraine, Field Academies of Sciences and Their Property Complex” (adopted in 2002, last amendments introduced in 2010); “On Innovation” (adopted in 2002, last amendments introduced in 2011); “On Scientific Parks” (adopted in 2009, last amendments introduced in 2010); “On the National Programme of Information” (adopted in 1998, last amendments introduced in 2010); “On State Regulation of Actions in the Technology Transfer Field” (adopted in 2006, last amendments introduced in 2011); “On Priorities in Innovation Activities in Ukraine” (adopted in 2011). It is worth emphasising that the above mentioned Laws of Ukraine include part(s) related to international cooperation.

In addition, central executive authorities whose activities are related to S&T have introduced internal documents to regulate S&T activities.

The Law of Ukraine “On Priorities of Science and Technology Development” defines the following national priorities up to 2020:

- basic scientific research of the most important problems of scientific and technological, social and economic, political and human potential development to ensure Ukraine’s competitiveness in the world and sustainable development of its society and state;

177 State Statistics Service of Ukraine: Science and Technology Activities in Ukraine - Statistical Data Collection (Державна Служба Статистики України: Наукова та інноваційна діяльність в Україні - Статистичний збірник, ДП „Інформаційно-видавничий центр Держстату України”) Киев 2011, p. 31 (data for 2010); the number of R&D Personnel is 141,000.
• information and communication technologies;
• energy and power efficiency;
• efficient nature management;
• life sciences, new technologies of prevention and treatment of the most wide-spread diseases;
• new substances and materials.

The S&T priorities are defined according to the National Target S&T and Innovation Development Forecast Programme of Ukraine. They are discussed by the scientific community and submitted by the Cabinet of Ministers of Ukraine to Verkhovna Rada of Ukraine for correction.

On 7 September, 2011 the Cabinet of Ministers of Ukraine adopted a Resolution “On Approval of the List of Priority Thematic Directions of Scientific Research and Science and Technology Designs for the period up to 2015.”

The Law of Ukraine “On Priorities in Innovation Activities in Ukraine” defines the following strategic innovation priorities for the period 2011-2021:
• assimilation of new technologies of energy transportation, putting into operation energy-efficient and resource-saving technologies, assimilation of alternative sources of energy;
• assimilation of new technologies, development of the transportation system, rocket and space field, aircraft industry and shipbuilding, armament and military technologies;
• assimilation of the new technologies of materials production, their processing and interconnection; creation of the nano-materials and nano-technologies industry;
• technological modernization and development of the agro-industrial complex;
• introduction of new technologies and equipment for a quality medical service, treatment and pharmaceutics;
• wide use of technologies for cleaner manufacturing and environment protection;
• development of modern information and communication technologies and robotics.

The newly established State Agency on Science, Innovation and Informatization of Ukraine is part of the central executive authority system to implement the state policy in the field of scientific, scientific-technological and innovation activities, informatization, formation and use of the national electronic information resources and ensuring conditions to create an information society178.

Also, according to the Resolution of the Cabinet of Ministers of Ukraine, the State Agency on Science, Innovation and Informatization of Ukraine is the main administrator of the budget funds and responsible authority for implementation of the budget programme “Fulfilment of Ukraine’s Commitments in the Field of International Science and Technology Cooperation.”

I.11.1.3 Important Research Organisations
The National Academy of Sciences of Ukraine (NASU) is the highest state-supported research organisation, enrolling academicians, corresponding members and foreign members. It integrates all researchers of its institutions, carries out studies in various branches of knowledge, and develops scientific fundamentals for technological, socio-economic and cultural advancement of the nation. According to its Statute, the Academy enjoys the right of self-government in regards to decision making about its own activities. It comprises of three sections incorporating fourteen research departments, including the Department of Information Science. The Academy has six regional science centres, which are also answerable to the Ministry of Education and Science. Their activities are aimed towards promoting the R&D potential of respective regions combining scientists’ efforts to address priority regional issues. The basic elements in the NASU structure are research institutes and other similar institutions.

The National Academy of Sciences endeavours to strengthen international scientific ties and further integration into the global academic community. Academy institutions are engaged in a number of joint research projects under direct bilateral agreements with foreign research institutions and those financed by grants provided by numerous international science foundations and programmes.

NASU has concluded agreements and set up intellectual contacts with research centres in more than fifty countries of Europe, Asia and the Americas; in particular with the German Research Society (DFG), the National Centre for Scientific Research (CRNS, France), the National Research Bureau of Italy (CNR), the Scientific and Technological Research Council of Turkey (TUBITAK) and many foreign universities. It has significantly advanced multilateral collaboration of the academies of sciences of the Black Sea region countries.

NASU is involved in the activities of over twenty prestigious international research organisations: International Institute for Applied Systems Analysis (IIASA, Austria), Joint Institute for Nuclear Research (Russia), European Centre for Nuclear Research (CERN), and it interacts extensively with UNESCO, IAEA, WHO.

The Academy and its institutions represent Ukraine in the International Council for Science (ICSU), in more than thirty professional science unions and associations.

As of March 2010, there are 881 universities, colleges and technical schools in Ukraine. The following universities make the top five according to the national rating of 2011 conducted by the Project “Top-200 Ukraine”:

- Taras Shevchenko National University of Kyiv;
- National Technical University of Ukraine “Kyiv Polytechnic Institute”;
- Bogomolets National Medical University;
- National University of Kyiv-Mohyla Academy;
- V.N. Karazin Kharkiv National University.

The rating includes the following factors: a) quality of scientific and teaching potential; b) quality of education; c) international recognition. In other words, S&T research and international S&T cooperation make a part of the rating.

In 2007, the Cabinet of Ministers of Ukraine adopted a Resolution “On Approval of the Concept of the State Target Programme ‘Science in Universities’ for 2008-2012.” The main objectives of the Programme is to ensure legal, economic and organisational components to boost scientific activities and to improve its integration with university education, to create pilot research universities in order to train experts to carry out competitive research.

As regards the private sector, it is a source for financing science and technology research and development in Ukraine179. At the same time, several private universities of Ukraine report that they conduct S&T research at their institutions180.

I.11.2 Current Trends and Challenges in International Cooperation

I.11.2.1 National Policies

The S&T international cooperation factor is considered of high importance in and for Ukraine. To facilitate cooperation between Ukraine and the European Union, the sub-committee No. 7 “Science and technologies, researches and developments, education, culture, social health, information society and media” was established in accordance with the Resolution No. 1074 of 13 June, 1998 of the Cabinet of Ministries of Ukraine. This Sub-committee has launched a working dialogue between the central executive authorities of Ukraine and corresponding subdivisions of the European Union on the following topics: socio-economic development; cooperation in education, science and culture; health protection and information society.

The policy drive for the EU-Ukraine science and technology cooperation includes the following:

- European Neighbourhood Policy
- EU-Ukraine Association Agenda to prepare and facilitate the implementation of the Association Agreement
- National Indicative Programme 2011-2013
- Agreement on Cooperation in Science and Technology between the European Community and Ukraine

The developed documents read, in particular, “Support for scientific and technological cooperation will also be important with a view to contributing to sustainable and equitable economic development of Ukraine including through fuller participation in research-related activities such as the 7th Framework Programme, joint research projects, the Marie Curie international mobility scheme for scientists and practical training at the seven institutes of DG Joint Research Centre (DG JRC).” The EU-Ukraine Association Agenda to prepare and facilitate the implementation of the Association Agreement contains a section related to science and technology which provides for the following:

180 http://osvita.com/publications/22-10-2010/1287764567/
• 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.

I.11.2.2 Bilateral Agreements
Ukraine is involved in a wide range of S&T cooperation on the basis of bilateral agreements. It has agreements on science and technology cooperation with eleven EECA countries: Azerbaijan, Armenia, Belarus, Georgia, Moldova, Russia, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan, and seventeen EU countries: Austria, Bulgaria, Germany, Estonia, Finland, France, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Slovenia, Spain. The agreements define specific areas in which scientific potential on the bilateral level can be used most effectively. These agreements were concluded on the governmental level with the corresponding ministries of the partner countries.

The total number of S&T bilateral agreements concluded by Ukraine is more than fifty.

In addition, the following bilateral agreements have been concluded by the National Academy of Sciences of Ukraine (Table page 172).

Also, bilateral cooperation agreements have been concluded on the university level by key Ukrainian universities.

I.11.2.3 Regional Network / Cooperation
Ukraine has close S&T cooperation links with the neighbouring countries based on bilateral agreements.

Networking/cooperation is also ensured by four cross-border programmes implemented within ENPi:
• Cross-Border Cooperation Programme Poland-Belarus-Ukraine 2007-2013
• Joint Operational Programme Romania-Ukraine-Republic of Moldova 2007-2013
• Joint Operational Programme Hungary-Slovakia-Romania-Ukraine 2007-2013
• Black Sea Cross-Border Cooperation Programme 2007-2013

According to the survey conducted by G.M. Dobrov Centre for Scientific and Technological Potential and Scientific Studies (STPS Centre) of the National Academy of Sciences of Ukraine with STCU project partners, Ukraine has close cooperation in Europe with Germany, Russia, France, the United Kingdom and Poland.

The number of co-publications is considered by experts as an important factor to characterise S&T networking and cooperation. For further information, please see the Table 19 (page 174).

I.11.2.4 European Neighbourhood Policy
The European Neighbourhood Policy (ENP) is one of the European Union’s newest external relations policies, aiming to bring Europe and its neighbours closer to their mutual benefit and interest. It was first outlined in a Commission Communication in March 2003, followed by a more developed European Neighbourhood Policy Strategy Paper published in May 2004 in order to avoid creating new borders in Europe after its enlargement with ten new member countries. In October 2003, the European Council in Brussels endorsed this initiative and encouraged the Commission to take it forward. The Commission then started explanatory discussions with two of the three East European states that have Partnership and Cooperation Agreements (PCAs) in force, namely, Ukraine and Moldova.

In 2010 an intensive and varied range of EU-Ukraine meetings took place, most formally at the level of the EU-Ukraine Summit, the Cooperation Council and the seven subcommittees. In addition, progress in implementing the Association agenda was reviewed at the level of the Joint Committee of Senior Officials. In addition, progress in implementing the Association agenda was reviewed at the level of the Joint Committee of Senior Officials. More broadly, Ukrainian authorities and civil society representatives participated actively in the multilateral framework of the Eastern Partnership, and contributed to the working platforms. On a bilateral basis, Ukraine and the EU also discussed institutional capacity building in the framework of the Eastern Partnership Comprehensive Institution Building Programme.

I.11.2.5 Partnership and Cooperation Agreement
The current legal basis of the EU-Ukraine relations is laid down by “The Partnership and Co-Operation Agreement between the European Communities and Their Member States and Ukraine” from 14 June, 1994 (in force since 1 March, 1998), which initiated the cooperation on political, economic and trade, and humanitarian issues.
<table>
<thead>
<tr>
<th>Partner country</th>
<th>Institution</th>
<th>Date of signing</th>
<th>Name of Agreement/Cooperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia</td>
<td>National Academy of Sciences of the Republic of Armenia</td>
<td>01/2005</td>
<td>Agreement on S&amp;T Cooperation</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>Academy of Sciences of Azerbaijan</td>
<td>05/1996</td>
<td>-</td>
</tr>
<tr>
<td>Austria</td>
<td>Austrian Academy of Sciences</td>
<td>05/2004 (renewed)</td>
<td>Protocol</td>
</tr>
<tr>
<td>Belarus</td>
<td>National Academy of Sciences of Belarus</td>
<td>07/02/2002</td>
<td>Agreement on S&amp;T Cooperation</td>
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<tr>
<td>Belgium</td>
<td>Ghent University, Belgium</td>
<td>14/03/1996</td>
<td>-</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Academy of Science of Bulgaria</td>
<td>07/1996</td>
<td>-</td>
</tr>
<tr>
<td>Canada</td>
<td>Royal Society of Canada</td>
<td>22/05/1997</td>
<td>-</td>
</tr>
<tr>
<td>Cuba</td>
<td>Cuban Academy of Sciences</td>
<td>1999</td>
<td>-</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Academy of Sciences of the Czech Republic</td>
<td>31/10/2000</td>
<td>-</td>
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<tr>
<td>Egypt</td>
<td>Academy of Scientific Research and Technology of Egypt</td>
<td>22/04/1994</td>
<td>-</td>
</tr>
<tr>
<td>Estonia</td>
<td>Estonian Academy of Sciences</td>
<td>02/10/2000</td>
<td>-</td>
</tr>
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<td>Finland</td>
<td>Academy of Finland</td>
<td>31/10/1994</td>
<td>-</td>
</tr>
<tr>
<td>France</td>
<td>University of Toulouse – Paul Sabatier; CNRS</td>
<td>12/02/2004</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>European Scientific Association of Geo Research (EISCAT)</td>
<td>18/11/2005</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>European Organization for Nuclear Research (CERN)</td>
<td>08/06/2006</td>
<td>Memorandum of Understanding</td>
</tr>
<tr>
<td>Germany</td>
<td>(DFG) Deutsche Forschungsgemeinschaft</td>
<td>04/07/1995</td>
<td>Agreement on S&amp;T Cooperation</td>
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<tr>
<td>Great Britain</td>
<td>London Royal Society</td>
<td>07/10/1991</td>
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<tr>
<td>Hungary</td>
<td>Hungarian Academy of Sciences</td>
<td>03/08/2006</td>
<td>-</td>
</tr>
<tr>
<td>Italy</td>
<td>University of Catania, Accademia Nazionale dei Lincei, National Research Council (CNR)</td>
<td>1994 25/01/1994 06/12/2005</td>
<td>-</td>
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<td>India</td>
<td>Ministry of Sciences and Technology of India, ARC International, National Research Council (CNR)</td>
<td>09/06/1993 07/04/1994 20/06/2003</td>
<td>-</td>
</tr>
<tr>
<td>Israel</td>
<td>Israel Academy of Sciences and Humanities</td>
<td>12/1993</td>
<td>-</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>Ministry of Sciences – Academy of Sciences of Kazakhstan</td>
<td>05/1998</td>
<td>-</td>
</tr>
<tr>
<td>Korea</td>
<td>Academy of Sciences of Korean People's Democratic Rep.</td>
<td>10/09/1999</td>
<td>-</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>National Academy of Sciences of Kyrgyz Republic</td>
<td>08/1996</td>
<td>-</td>
</tr>
</tbody>
</table>
The objectives of the partnership are defined in Article 1:

“\[A\] Partnership is hereby established between the Community and its Member States, of the one part, and Ukraine, of the other part. The objectives of this Partnership are:

- to provide an appropriate framework for the political dialogue between the Parties allowing the development of close political relations;
- to promote trade and investment and harmonious economic relations between the Parties and so to foster their sustainable development;
- to provide a basis for mutually advantageous economic, social, financial, civil scientific technological and cultural cooperation;
- to support Ukrainian efforts to consolidate its democracy, to develop its economy and to complete the transition into a market economy.”

The conclusion of the PCA allowed establishing a regular bilateral dialogue between Ukraine and the EU on political and sectoral levels, to introduce trade regulations based on the principles of GATT/W TO, to determine the priorities of Ukrainian legislation adaptation to European standards (acquis communautaire) in main sectors of the Ukrainian economy. Seven priorities are listed in the PCA, such as: energy, trade and investments; justice and internal affairs; adaptation of Ukrainian legislation to that of the EU; environment protection; transport; cross-border cooperation; cooperation in science, technology and space. Based on PCA, the political dialogue between Ukraine and the EU is developing into annual meetings (Summit Ukraine/EU), with the participation of the President of Ukraine, the President of the European Council and the President of the European Commission; meetings of the Cooperation Council with the participation of
TABLE 19: CO-PUBLICATIONS WITH THE EU RESEARCHERS IN UKRAINE AND THE EU COUNTRIES\textsuperscript{181}

<table>
<thead>
<tr>
<th>Countries</th>
<th>Total number (Thomson Reuters; 2007) \textsuperscript{1}</th>
<th>Part of publications in the world flow, % (Thomson Reuters; 2007) \textsuperscript{1}</th>
<th>Total number (Scirus; 2010) \textsuperscript{2}</th>
<th>Number of co-publications with the EU (Scirus; 2010) \textsuperscript{2}</th>
<th>Top-groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>UKRAINE</td>
<td>1847\textsuperscript{182}</td>
<td>0.2</td>
<td>1542</td>
<td>942</td>
<td>-</td>
</tr>
<tr>
<td>Germany</td>
<td>44408</td>
<td>5.9</td>
<td>66669</td>
<td>193</td>
<td>Top 10</td>
</tr>
<tr>
<td>Poland</td>
<td>7136</td>
<td>0.9</td>
<td>10404</td>
<td>145</td>
<td>25 and more publications</td>
</tr>
<tr>
<td>France</td>
<td>30740</td>
<td>4.1</td>
<td>57017</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>47121</td>
<td>6.2</td>
<td>82663</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>26544</td>
<td>3.5</td>
<td>46357</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>20981</td>
<td>2.8</td>
<td>35178</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>Czech</td>
<td>3689</td>
<td>0.5</td>
<td>5752</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>9914</td>
<td>1.3</td>
<td>16575</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>4825</td>
<td>0.6</td>
<td>8763</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>14210</td>
<td>1.9</td>
<td>29393</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>7071</td>
<td>0.9</td>
<td>13611</td>
<td>24</td>
<td>Top 10+9</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>801</td>
<td>0.1</td>
<td>1270</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>4989</td>
<td>0.7</td>
<td>7798</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>4980</td>
<td>0.7</td>
<td>9456</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Ireland</td>
<td>2487</td>
<td>0.3</td>
<td>6440</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Slovakia</td>
<td>971</td>
<td>0.1</td>
<td>1024</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>5236</td>
<td>0.7</td>
<td>10621</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Lithuania</td>
<td>456</td>
<td>&lt; 0.1</td>
<td>648</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Slovenia</td>
<td>1280</td>
<td>0.2</td>
<td>1796</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>2452</td>
<td>0.3</td>
<td>3818</td>
<td>8</td>
<td>Less than 10 publications</td>
</tr>
<tr>
<td>Portugal</td>
<td>3424</td>
<td>0.5</td>
<td>7287</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Romania</td>
<td>1252</td>
<td>0.2</td>
<td>2541</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Estonia</td>
<td>502</td>
<td>&lt; 0.1</td>
<td>878</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Latvia</td>
<td>147</td>
<td>0.0</td>
<td>225</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Luxembourg</td>
<td>73</td>
<td>0.0</td>
<td>377</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cyprus</td>
<td>139</td>
<td>0.0</td>
<td>468</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Malta</td>
<td>23</td>
<td>0.0</td>
<td>119</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>European Union countries</td>
<td>245,852</td>
<td>32.4</td>
<td>427,148</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other countries</td>
<td>758,142</td>
<td>100.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>


\textsuperscript{181} G.M. Dobrov Centre for Scientific and Technological Potential and Scientific Studies of the National Academy of Sciences of Ukraine

\textsuperscript{182} 39 position within 212 countries
the Prime Minister of Ukraine, High Representative of the EU for Foreign and Security Policy and Minister of Foreign Affairs of the country holding the rotating presidency of the EU; Committee and sectoral subcommittees responsible for cooperation between Ukraine and the EU; Parliamentary Cooperation Committee; political dialogue meetings of foreign affairs ministers; sector dialogues meetings; regular meetings on the working group level. Every year an exchange of visits on the highest and high levels takes place.

In order to foster bilateral relations and to take into account new conditions of cooperation, particularly in the context of the 2004 enlargement, the European Union and Ukraine worked out and approved at the Cooperation Council meeting on 21 February, 2005 the Ukraine-EU Action Plan. It is a bilateral political document, which gives the opportunity to extend cooperation between Ukraine and the European Union, without any amendments to the existing legal basis. The Action Plan listed precise commitments of Ukraine as to the strengthening of democratic institutions, fighting corruption, structural economic reforms and the development of cooperation with the EU in sector fields. Among the most important achievements as to the development of relations for the time of duration of the Action Plan: concession to Ukraine of a status of the country with market economy in the framework of anti-dumping legislation of the EU, the concession to Ukraine of a right to align itself with the EU declarations, the conclusion of agreements on visa facilitation and on re-admission, the extension to Ukraine of the financing provided by the European Investment Bank, deepening of sectoral cooperation, the start of negotiations aiming at the signing of a new agreement to replace the PCA.

The Association Agenda to prepare and facilitate the implementation of the Association Agreement, which substituted the Action Plan, was adopted by the EU-Ukraine Cooperation Council on 23 November, 2009, and entered into effect on 24 November, 2009.

I.11.2.6 National and bilateral programmes
Below are some national and state S&T (or S&T related) programmes of Ukraine:

- National Programme of Information (started in 1998; the end year is not specified);
- National Programme of SME Support in Ukraine (started in 1998; the end year is not specified);
- National Programme of Establishing of the National Ecology Network for 2000-2015;
- National Target S&T Space Programme of Ukraine for 2008-2012;
- State Programme on S&T Development Forecast for 2008-2012;
- State Target Programme “Science in Universities” for 2008-2012;
- State Programme “Drinking Water of Ukraine” for 2006-2020;
- State Target S&T Programme “Development and Putting into Operation Energy Saving Light-Emitting Diode Sources of Lighting and Lighting Systems Based on Them” for 2009-2013;
- State Scientific Programme “Development of the Human Resources of Ukraine” (for 2010-2013);
- State Scientific Programme “Economic Problems of Development of the State” (for 2010-2013);
- State Scientific Programme “Strategic Ways of S&T Potential Development in Ukraine” (for 2010-2013);
- State Target Social Programme “Transplantation” for 2008-2012;
- State Target Economic Programme of Power Efficiency for 2010-2015;
- State Target S&T Programme “Nanotechnologies and Nanomaterials” for 2010-2014;
- State Target S&T Programme “Development and Putting into Operation of GRID Technologies” for 2009-2013;
- State Target S&T Programme on Manufacturing of Medical Facilities for 2009-2013;
- State Target Programme “Diabetes” for 2009-2013;
- State Target Ecological Programme On Developing Secure Conditions at the Uranium Objects of the Production Enterprise “Pre-Dnipro Chemical Plant” for 2010-2014;
- State Target Ecological Programme On Monitoring of Natural Habitat for 2008-2012;
- State Target Programme on Closing Production and Use of the Ozone Depleting Substances for 2004-2030;
- State Target Programme on Utilization of the Liquid Missile Fuel for 2010-2014;
- State Target Programme “Forests of Ukraine” for 2010-2015;
- State Target Economic Programme “Creation of
Innovative Infrastructure in Ukraine” for 2009-2013;
• State Target S&T Programme on Research in Antarctic for 2011-2020;
• State Target S&T Programme on Development of Sensor Knowledge-Based Products for 2008-2012;
• State Target S&T Programme “Creation of Chemical and Metallurgical Production Field of Virgin Silicon” for 2009-2012;
• Target Complex Programme “Basics of Genomics and Proteomics” for 2007-2011;
• Inter-branch Complex Programme “Health of the Nation” for 2002-2011.

I.11.2.7 EU Framework Programme for Research and Technological Development
The National Information Centre for Ukraine-EU S&T Cooperation (NIP Ukraine) was established on 1 August, 2003 to support integration of the Ukrainian scientific community into the ERA by facilitating access of the scientific community of the country to the European Community research through the National Information Points Network. NIP Ukraine has set up a network of regional contact points to coordinate their activities.

For the period from March 2005 till December 2006, NIP Ukraine had served as the INTAS Helpdesk in Ukraine.

NIP Ukraine has a positive experience in implementing and coordinating international academic and scientific activities as well as disseminating S&T-related information and signposting up to date information to authorised bodies and institutions within scientific networks. Furthermore, it has good partnership relations with the institutions of the National Academy of Sciences of Ukraine, the branch-oriented research institutions of the Ministry of Industrial Policy of Ukraine and specific agencies, for instance, the National Aerospace Agency of Ukraine, with which it has concluded cooperative agreements. NIP Ukraine runs the general information services on FP procedures and requirements, networking with educational and research institutions, as well as providing partner-search assistance to Ukrainian potential FP participants. More specific activities include: organizing and conducting specialised conferences, workshops and seminars for target groups, training and consulting potential FP project participants, publishing information bulletins on FP and issuing guides on FP rules, procedures and requirements. NIP Ukraine is INCO NCP, as well as serving as NCP in other areas including ICT and as a contact point for the FP7 priorities before the NCP system was established in Ukraine.

NIP Ukraine is a partner in the following FP6 and FP7 projects: “Support for participants in ICT priority by network for IST under the transition to the 7th Framework Programme –Idealist7fp,” “Scenarios for a co-ordinated approach to sustainable S&T cooperation with the Eastern neighbours of the EU – SCOPE-EAST,” “Strengthening cooperation between the European Research Area and NIS – ERANIS,” “Promoting International Cooperation for Environmental Research Through Dissemination and Networking Activities - INT-ER-LINK,” “S&T International Co-operation Network for Eastern European and Central Asian Countries - IncoNet EECA,” “Extending ICT research cooperation between the European Union, Eastern Europe and the Southern Caucasus – EXTEND” and “Enhancing the bilateral S&T Partnership with Ukraine – BILAT-UKR”. NIP Ukraine is the national expert for Ukraine within the FP7 project “Trans-national cooperation among ICT NCP – Idealist2011.”

NIP Ukraine has been nominated as NCP INCO, Mobility and Legal and Finance of FP7. Along with NIP Ukraine, other institutions nominated as thematic NCPs by the Ministry of Education and Science, Youth and Sports of Ukraine, the State Agency of Ukraine on Science, Innovations and Information, the National Academy of Sciences of Ukraine and the National Space Agency of Ukraine make the NCP network in the country.

As of the beginning of 2011, Ukraine’s participation in the EU Seventh Framework Programme for Research and Development is as follows: number of project proposals – 740; mainlisted projects – 150; total budget of the supported projects (not of the Ukrainian teams) is almost €12 billion.

In comparison to Ukraine’s participation in the first years of FP7 and its participation in FP6, the number of project proposals has risen by 79% and the number of mainlisted projects by 64%.

I.11.2.8 European Neighbourhood Policy Instrument (ENPI)
The European Commission and the High Representative of the Union for Foreign Affairs and Security Policy published the annual “neighbourhood package” on 25 May, 2011, which consists of a communication proposing a reviewed European Neighbourhood Policy (ENP), twelve country reports on developments in 2010, including one on Ukraine, as well as a sector report and
a report on the Eastern Partnership. The report contains the S&T related component (Section 6: Transport, Energy, Environment, the Information Society, Research and Development) which reads as follows:

“Ukraine continued to update its research and innovation policy with more direct and sustainable economic development objectives. Ukraine’s participation in the 7th Research Framework Programme (FP7) continued to be encouraging with an increased number of successful proposals in 2010. As of November, ninety-one Ukrainian research entities were involved in successful FP7 research projects, receiving an EU contribution of €8.08 million. The possibility to associate Ukraine with FP7 is being explored. The ongoing bilateral ‘Bilat-UKR’ project organised various seminars and workshops supporting Ukraine’s participation in FP7.

As part of this project, analysis has been carried out on the issues of scientists’ mobility, research infrastructures and innovation as a basis fostering EU-Ukraine collaboration in these areas. The EU-Ukraine Science and Technology (S&T) cooperation agreement is in the final stages of being renewed for a further period of five years.

Ukraine continued to participate actively in the International Science & Technology Cooperation Network for Eastern European and Central Asian countries (FP7 IncoNet EECA project), which aims to support a bi-regional EU-EECA policy dialogue on science and technology and to increase EECA participation in FP7. In October 2010, an IncoNet Brokerage Event for the FP7 energy theme was organised in Kyiv by the FP7 National Information Centre.

Ukraine took an active part in the Black Sea ERA-NET project which aims to help coordinate national research programmes (from EU member states and partner countries) targeting the Black Sea region as a whole. The project consortium for the Black Sea ERA-NET project recently launched a first joint call for proposals to promote collaborative research on innovative approaches to sustainable development in the region.”

I.11.2.9 Lifelong Learning Programme (LLL)

Erasmus Mundus Programme was launched in Ukraine in its current shape in 2004.

Action 1: Erasmus Mundus Joint Courses and Doctorates

One hundred and fifty-eight students and thirty-five scholars have been awarded grants within Action 1 of the Programme.

In the 2009/2010 academic year thirty-six Ukrainians were awarded grants. In the 2010/2011 academic year twenty-eight Ukrainian students and scientists were awarded grants, 104 are in the reserve list and 156 are not selected. The total number of applications is 288.

Action 2: Erasmus Mundus Partnership

Ninety-eight mobility grants were awarded in 2009 and one hundred in 2010. The partners of the mobility consortia on the Ukrainian side are the following universities:

- Taras Shevchenko National University of Kyiv;
- Dnipropetrov’sk National University;
- Kharkiv National Academy of Municipal Economy;
- Bogomolets National Medical University;
- Ivan Franko National University of L’viv;
- Taurida National V.I. Vernadsky University.

Action 3: Information Grants for Erasmus Mundus National Structures

Unfortunately, no information on Ukraine’s participation in Action 3 was able to be found.

Ukraine joined TEMPUS on 29 April, 1993. At that time the programme focused on improvements of university governance and management, upgrading old curricula and developing new courses and programmes, professional development of teachers, especially in such disciplines as economics, foreign languages, social science, European studies and law.

Ukrainian higher education institutions actively participated in the TEMPUS programme from the very beginning. Therefore, it is only reasonable that currently TEMPUS projects are being implemented in most regions of Ukraine. Over that period, Ukrainian universities have demonstrated their commitment to reforms and strong dedication to the development of higher education, introduction of innovative approaches and state-of-the-art technologies in the educational field.

During the third phase of the TEMPUS programme in 2000-2006 the focal point was shifted towards new priorities and new disciplines. Ukraine’s participation

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in the TEMPUS III programme coincided with its aspirations to join the European Higher Education Area in line with the Bologna process, which was reflected in the projects. As to the list of priority disciplines for that period of time, it included, in addition to economics and business management, agrarian science, ICT and environment.

Starting from 2000, participation in the TEMPUS projects is broadened beyond higher education institutions and is opened to companies, non-governmental and non-profit organisations and authorities. Accordingly, among participants of the TEMPUS projects in Ukraine, we can find the Secretariat of the Cabinet of Ministers of Ukraine, Ministries of Education and Science, Environmental Protection, Agricultural Policy, regional state administrations, municipalities, entrepreneurs’ associations and students’ unions, agricultural companies, ports and research institutes.

Currently, the priorities and directions of the TEMPUS programme in Ukraine are directly linked to the advancement of the Bologna process.

As a consequence of the TEMPUS projects, new courses and curricula were developed that meet the current requirements of the Ukrainian labour market. University teachers confirm that cooperation with European colleagues within the TEMPUS project enabled them to obtain new knowledge, master new teaching skills and evaluation techniques, which resulted in a greater competitiveness of their universities, also improving their status and standing.

On the whole, the TEMPUS programme facilitated the internationalization of Ukrainian universities, helped to establish long-term partnerships between them and their European counterparts that continued after the project’s completion, and assisted with initiation of new research projects or exchange programmes. On many occasions, TEMPUS projects helped to set up a dialogue between higher education institutions and the public authority in charge or its regional branches; between faculty and administration; between employers, teachers and students.

Three calls for proposals of TEMPUS IV resulted in twenty-eight projects with the Ukrainian HEI participation: twenty-five projects JP (Joint Projects) and three structural measures, twenty-three multi-country and five national projects are among them. The list of all projects can be found at: http://eacea.ec.europa.eu/tempus/results_compendia/projects_description_en.php

Within the framework of the TEMPUS I, II, III stages from 1993 to 2006, generally 299 TEMPUS projects had been approved for Ukraine, with the overall funding of €53.6 million: JEPs: 110; Pre-JEPs: 47; CPs: 14; IMGs: 100; SCMs: 28.

1st call for proposals of the TEMPUS IV project with the participation of Ukrainian universities: twelve projects JP (Joint Projects) have been implemented since February 2009.

2nd call for proposals of the TEMPUS IV project with the participation of Ukrainian universities: twelve projects JP (preliminary budget is €9 million).

3rd call for proposals of the TEMPUS IV project with the participation of Ukrainian universities: five projects JP.

The TEMPUS project “Improvement of education in the field of environmental management” (Grant Agreement Nr 144746-TEMPUS-2008-RU-JPCR) started on the 15 January, 2009. The Project duration is three years, total budget (€1,133,460, including EC grant) €1,080,489. The consortium consists of thirteen partners from nine countries: five EU-member states and four Partner-countries184. Coordinator of the project is Saint-Petersburg State University in Russia. Ukrainian partners are V. N. Karazin Kharkiv National University (KKNU), Taurida National V. I. Vernadsky University (TNU), the Ukrainian scientific and Research Institute of Ecological Problems, and ETB-Technology Trade Ltd.

In the framework of the TEMPUS project from 11-17 April, 2011, Prof. John Kiousopoulos (Spatial Analysis Laboratory, Technological Educational Institute of Athens, Greece) visited V. N. Karazin Kharkiv National University. The key aim of the visit was to give lectures on the topic “Spatial Planning in Hellas, Legislation & Milestones [with References in E. U.]” for students and teachers of the School of Ecology.

On 14 April, 2011, during Prof. John Kiousopoulos’s visit, an official opening of the classroom for interactive learning was organised and was launched by Prof. Zarif F. Nazirov (Vice-President for International Cooperation (Research and Education), KKNU). The

184 For more details see www.ecotempus.ru
The creation of the classroom is one of the key project outputs. Representatives from the School of Ecology and other Schools, as well as TEMPUS project partners were present at the ceremony. An internet conference with a team from Taurida National V. I. Vernadsky University was carried out during which partners exchanged their opinions concerning the project’s progress, but also the equipment and the distance learning system were checked. The classroom will be used in the educational process for on-line lectures, internet conferences and other events, demanding special equipment and software.

I.11.3 Challenges

Ukraine has adopted several laws which outline specific strategic challenges, in particular the Laws of Ukraine “On Priorities of Science and Technology Development” and “On Priorities in Innovation Activities in Ukraine” and the Resolution of the Cabinet of Ministers of Ukraine “On Approval of the List of Priority Thematic Directions of Scientific Research and Science and Technology Designs for the period up to 2015”.

As regards S&T cooperation between Ukraine and the European Union, a major element of its full realisation is implemented through both the EU Framework Programme and numerous bi-/multilateral S&T cooperation programmes and activities of the EU Member States with the participation of Ukraine. Concerning an increase of direct science and technology cooperation activities, it is necessary to further foster Ukrainian participation within the framework of those programmes. Several steps towards this goal have been already initiated on the state level, such as the creation of the Ministry of Education and Science, Youth and Sports of Ukraine based on the Ministry of Education and Science of Ukraine, the establishment of the State Agency of Ukraine on Science, Innovations and “Informatization” and the development of the NCP network in Ukraine (nomination of thematic NCPs). Organisational changes and distribution of S&T functions between the executive authorities may: a) assist in raising awareness in the EU of the Ukrainian science and technology and innovation activities b) solve the problems of funding mechanisms within the field c) foster development of scientific infrastructure. The outcome of the process could be manifold: the Ukrainian researchers participate in more international S&T projects, gain more experience, including collaborative team work experience, etc.

Better involvement of young scientists and researchers in the international S&T projects, as an addition to the state programmes, may prevent drain-brain and increase their motivation to conduct out science and research, both on a national and international level. It should also refer to other, more experienced groups within the scientific community. The Ukrainian Government takes measures to cope with the situation via corresponding national programmes.

According to the Ukrainian economists, the pace of creating innovative infrastructure does not meet today’s demands. The key problem to implement the innovative model of Ukraine’s development is a discontinuity between the phases of scientific research and putting innovation in operation due to a lack of effective mechanisms of transformation of scientific knowledge into innovative ideas which can be used in the economy.185

Also, the experts related to the field discuss a better involvement of the research diaspora to strengthen the S&T dialogue between Ukraine and the EU. The legal and financial component is considered as one of the most important, in particular when it involves the implementation of the international science and technology projects.

I.12 Country Report Uzbekistan

I.12.1 Current State of S&T and Major Policy Challenges

I.12.1.1 S&T Indicators

TABLE 20: S&T LANDSCAPE 2010

<table>
<thead>
<tr>
<th>R&amp;D Expenditure as % of GDP</th>
<th>Number of research organisations</th>
<th>Number of researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
<td>202</td>
<td>26,145</td>
</tr>
</tbody>
</table>

I.12.1.2 Research Structure and Policy

Uzbekistan has the following Decrees and Laws related to science:

1. Decree of the Cabinet of Ministers, Republic of Uzbekistan No. 31 of 19/01/1998 “On state support of international scientific programmes, projects in the framework of international and foreign grants.”

2. Decree of the President of the Republic of Uzbekistan No. 436 of 07/08/2006 “On measures for the further development of coordination and management of science and technology.”


Science, technology and innovation policy in Uzbekistan is directed towards the increase of science and technology contribution to the development of the country’s economy, the supply of progressive structural and technological reforms in material production, the strengthening of economic independence and national consciousness, the assistance of citizens’ spiritual and harmonious development, as well as towards the strengthening of the relationship between science, education and industry.

The Committee for the Coordination of Science and Technology Development under the Cabinet of Ministers of Uzbekistan approved the priority directions for the development of science and technology for 2012-2020, which were developed by the leading scientists and specialists of the country jointly with interested ministries and departments.

The priority directions for the development of science and technology for 2012-2020 comprise the following thematic areas:

- Spiritual-moral and Cultural Development of a Democratic and Legal society, Innovation Economy formation
- Energy, Energy-resource saving
- Development of use of Renewable Energy Resources
- Development of Information and Communication Technologies
- Agriculture, Biotechnology, Ecology and Environmental protection
- Medicine and Pharmacology
- Chemical Industry and Nanotechnologies
- Science of the Earth (geology, geophysics, seismology).

I.12.1.3 Important Research Organisation

The Research complex of Uzbekistan includes 361 institutions in academic, higher education, medical, agricultural spheres (two hundred and two research institutes, sixty-two universities, sixty-five design organisations, thirty-two scientific and production associations and experimental enterprises).

The Academy of Science, the Ministry of Higher and Secondary Specialized Education, the Ministry of Agriculture and Water Resources and the Ministry of Healthcare of Uzbekistan are the main ministries with the biggest R&D infrastructures. The main task of the Uzbekistan Academy of Science is to solve the main fundamental and applied scientific problems of the country’s economy.

186 The Committee for Coordination of Science and Technology Development under the Cabinet of Ministers of Uzbekistan, 2010
The Academy has fifty research institutes in all fields of modern science and technologies, including physics, chemistry, biology, earth sciences, material sciences, information technologies, social sciences, humanities, etc. Having twelve research institutes, the Scientific & Production Association of Agriculture under the Ministry of Agriculture and Water Resources has the biggest R&D infrastructure in the field of agriculture. Research carried out by the Association is charged with solving the main S&T problems in the agricultural industry (breeding of new varieties of cotton and other industrial crops; resistance of plants to environmental stresses; water saving technologies; new effective fertilizers; horticulture; etc.). In addition to institutes and universities reporting to the above mentioned ministries, there are another 143, belonging to other ministries and independent entities with a similar significant research potential (approximately 25%). Coordination and financing of R&D activities of these entities are executed directly by the CCSTD and their research covers, practically, all priority fields in S&T.

I.12.2 Current trends & Challenges in International Cooperation

I.12.2.1 National Policies
The Presidential Decree of 20 February, 2002 No. PD 3029 “Improvement of the organisation of the scientific-technical activity” and Regulation of Cabinet of Ministers of the Republic of Uzbekistan of 19 January, 1998 “State support for the development of international scientific-technical relations, scientific programmes and projects by grants of international and foreign organisations and funds”.

I.12.2.2 Bilateral Agreements
The Republic of Uzbekistan has signed forty-two bilateral agreements on S&T cooperation on a high governmental level. Nine of them are between Uzbekistan and EU MS (i.e. Hungary, France, Czech Republic, Latvia, Lithuania, Poland, Italy, Germany and Bulgaria). Bilateral agreements have also been concluded between the Committee for Coordination of Science and Technology Development under the Cabinet of Ministers, the Uzbek Academy of Sciences, Research Institutes of the Uzbek Academy of Sciences and the Ministries. For example: Agreement between the Committee for Coordination of Science and Technological Development and the Ministry of Economy of Korea, the Russian Fund on Fundamental Research, the Department on Science and Technology of India, the CRDF Fund, the Agreement between the State Educational Institute of High Professional Education ‘State University of Kostroma named after Nekrasov’ and the Uzbek Scientific Research Institute of Pedagogical Science, named after Kari Niyazov,’ the Agreement between the Xinjiang Technical Institute of Physics and Chemistry and the Institute of Plant Substances Chemistry of Uzbek Academy of Sciences, the Agreement between the Institute of Bioorganic Chemistry of the Uzbek Academy of Sciences and the Shanghai Institute of Medical Materials, the Memorandum between the Korean Institute of Electronic Technology and the SPC “Physics Sun” of the Uzbek Academy of Sciences, the Memorandum between the Institute of Automatics and Electronics of the Uzbek Academy of Sciences and the National Centre of Scientific Researches of France (CNRS), the Agreement between the Uzbek Academy of Sciences and the Polish Academy of Sciences and others. Partnership links have been established with ministries and agencies of most EU countries and a number of international S&T foundations. Cooperation with EECA-countries is carried out within the framework of bilateral and multilateral S&T programmes. For example, in 2007 two collaborative calls for joint fundamental research projects were organised in the framework of the programmes “Uzbekistan-Russia 2008” and “Uzbekistan-Ukraine 2008.”

Under the programme “Uzbekistan-Russia 2008,” a number of twenty-two joint projects have been concluded on the following research priorities: solid-state physics and elementary particles, microelectronics, mathematics, astronomy, biology and biophysics, genetics, bioorganic chemistry, advanced materials, power, laser technologies, geology and seismology, and medicine.

Under the bilateral international programme of “Uzbekistan-Korea 2008” research projects and three

187 Uzbekistan Country report
188 http://mfa.uz/ru/dokumenti/
joint scientific and research projects were carried out in the field of biotechnology, physics and material sciences by scientists and specialists of the Institute of Material Sciences SPO “Physics-Sun” and Donets Physical and Technical Institute NAS Ukraine. Within the framework of the bilateral international programme “Uzbekistan-Korea 2010” five joint research projects have been conducted in the field of new materials and components since 2010. Furthermore, in June 2010 a call for fundamental research projects under the “Uzbekistan-CRDF 2010” was launched in the field of improvement of ground and water resources use.

In addition to this, the Uzbek scientists and specialists actively participated in the multilateral international research programmes in 2009. It allowed for $7,402,300 for the implementation of fifty-nine international research projects for the support of the scientific potential of the Republic of Uzbekistan. Grants of $1,057,445 for the realisation of twelve scientific projects are received under the programmes of the Scientific Committee of NATO, six grants $1,530,169 under the programmes STCU, nine grants of $1,228,899 under the programmes CRDF, five projects allocated €341,000 ($443,300) under the programmes of the FP7 EU and twenty-seven grants of $3,142,487 under other international programmes.

I.12.2.3 Regional Network / Cooperation

The main collaboration partners with Uzbekistan are South Korea, the USA, Europe, Russia and Germany. According to the ISI database, Uzbekistan scientists published 3,944 SCI articles and fifty-five SSCI and AHCI articles from 1997-2007. The average number of international publications produced by Uzbekistan researchers per million inhabitants was 12.9 in 2007. The average number of publications related to its GDP was 5.8 in 2007.

During the studied period the published articles are to a large extent (29.4%) in the field of physics and astronomy. Quite an important share of articles is also in the fields of chemistry (10.6%), closely followed by mathematics (8.85%) and engineering (8.1%).

However, in the recent years the areas of excellence have slightly changed. Thus, according to the Science Citation Index (SCI) in 2008, the priority field was organic chemistry, while that of SSCI and A&HCI were economics and public environmental and occupational health.

The articles with Uzbek participation had co-authors from eighty-five countries, which is the fourth highest number among EECA countries. The selected fifteen countries constitute 72.7%.

I.12.2.4 EU - Central Asia Strategy

The EU’s aim for Central Asia, supported by the European Commission, is to promote stability and security in the countries of Central Asia, to assist in their pursuit of sustainable economic development, to raise living standards, and to facilitate closer regional cooperation – both within Central Asia and between Central Asia and the EU – in a comprehensive manner, including bilateral relations between the EU and the five Central Asian countries individually.

The European Commission is currently implementing projects in the field of maternal care (Mother and Child Project), enhancing living standards, social services (Institutional Building and Partnership Programme) and private sector development (Central Asia Invest Regional Programme).

Important new programmes are currently being designed in the institutional and legal framework areas, such as “Support for the Uzbek Parliamentary System” and for the implementation of judicial reforms and criminal laws. Between 2011 and 2013, cooperation will target three main areas: raising living standards through rural and local development, rule of law and justice reform, and enhancing trade, business and SMEs. The European Commission is also supporting cooperation in the fields of renewable energy and energy efficiency, education, environment, border management and the fight against drugs.

I.12.2.5 Partnership and Cooperation Agreements (PCAs)

The beginning of relations with the European Union, unifying fifteen countries of Europe, is marked by the signing of the Memorandum of Mutual Understanding between the Government of the Republic of Uzbekistan and the Commission of the European communities (CEC) on 15 April, 1992. On 16 November, 1994 diplomatic relations were established.

In January 1995, the diplomatic mission of Uzbekistan at the CEC started in Brussels. On 1 August, 2002 the “House of Europe” (representation CAS on rendering technical assistance) began its work in Tashkent. It is an intermediate link in the establishment of an EU

189 5.6 EU EECA_ ST Cooperation
190 http://ec.europa.eu/europeaid/where/asia/country-cooperation/uzbekistan/projects_en.htm
delegation in Uzbekistan.

The Partnership and Cooperation Agreement (PCA) with Uzbekistan, signed in April 1996, has been the basis for EU-Uzbek bilateral relations since it entered into force in 1999.

The future EC assistance will focus on the following priority areas: promotion of human rights and democratisation, strengthening of civil society, rule of law, legal reforms and good governance, rural and local development.

I.12.2.6 EU Framework Programme for Research and Technological Development

The Uzbekistan National Information Point (NIP) for EU Framework Programmes was established in 1995. It is a non-profit organisation Indo-Uzbek Centre for Promotion of S&T Cooperation (IUCP-T) created under the law of Uzbekistan (Registration number 196 from 27 July, 1995) by the State Committee on Science and Technology of the Republic of Uzbekistan in order to render purpose-directed promotion to scientific institutions and organisations of Uzbekistan.

A number of seventeen Uzbekistan research organisations participated in the FP6 projects, of which the great majority falls under the heading “Specific Measures in the Support of International Cooperation.” Three projects were also funded under the thematic area “Sustainable Development, Global Change and Ecosystems.” For the exact division of the seventeen Uzbekistan teams’ participation in the projects by thematic areas, see below.

Up to now there are eight Uzbek research groups participating in the FP7 projects with funds of more than €354,000. One of them participated in a project in the priority area of “Food, Agriculture, and Biotechnologies” and another in “International Cooperation.”

1. Project “IncoNet EECA” has the INDO Uzbek Centre on Promotion of Science and Technical Cooperation Association IUCP T in Tashkent as its partner. The project is coordinated by the International Centre for Black Sea Studies in Greece.

2. Project “IRENE” has the National University of Uzbekistan named after Mirzo Ulugbek in Tashkent as its partner. The project is coordinated by Universita Degli studi di Trieste.

3. Project “EECALINK” has the INDO Uzbek Centre on Promotion of Science and Technical Cooperation Association IUCP T in Tashkent as its partner. The project is coordinated by the Karlova University in Prague.

4. Project “SEOCA” has three organisations from Uzbekistan as following: The State Enterprise Centre of Remote Sensing and GIS Technologies, Hydrometeorological Research Institute of Uzhydromet and Tashkent State Technical University named after Abu Raikhman Beruni. The project is coordinated by the Technical University in Berlin.

5. Project IncoNet CA/SC has the INDO Uzbek Centre on Promotion of Science and Technical Cooperation Association IUCP T in Tashkent as its partner. The project is coordinated by the International Centre for Black Sea Studies in Greece.

6. Project of Marie Curie “The origin of excess charge at water/hydrophobic interfaces” at the Heat Physics Department of Uzbekistan Academy of Sciences for the period 2010-2012.

7. Project of Marie Curie “Spectral properties of molecular clusters confined helium nanodroplets” at the Heat Physics Department of Uzbekistan Academy of Sciences for the period 2011-2012.

I.12.2.7 Development Cooperation Instrument (DCI)

The overall EU cooperation objectives, policy responses and priority fields for CA can be found in the EC Regional Strategy Paper for Central Asia 2007-2013 and the Central Asia Indicative Programme 2007-2010. In addition to the assistance under the Development Cooperation Instrument (DCI), Uzbekistan participates in ongoing regional programmes.

At national level, seventy-seven projects amounting to €125.8 million (currently working on four projects amounting to €7.3 million) were carried out through cooperation with the EU (1992-2002) on a TASIS line in Uzbekistan.

Within the framework of the interstate and national TASIS programmes more than 200 projects were carried out in a ten-year-period, with a total sum of approximately €440 million. A total of twenty-five projects amounting to more than €60 million have been completed. Uzbekistan is the second largest trading partner with the EU in the region after Kazakhstan. In
2003, the EU imported €600 million worth of goods from Uzbekistan and exported goods worth €400 million to the country. This is over four times higher than Uzbekistan’s trade with the US. Imports from Uzbekistan mainly consisted of agricultural products and textiles, and the EU’s main export products were machinery and chemical products.


The European Union is one of the major trade-economic partners of Uzbekistan. In 2002, the commodity circulation of the Republic with the EU states reached $833.1 million, whereas export made $392.1 million and import $440.9 million.

The greatest portion of Uzbek exports in 2002 was to Great Britain (51.03% of all exports to the EU) and in second place to Italy (24.43%). It is necessary to note that in 2001 these two countries were the largest importers of Uzbek goods among the EU countries. The lowest volume (less than 1%) in export of Uzbek production is registered with Denmark, Ireland, Luxembourg, Finland and Sweden.

The largest number of the Uzbek imports from the EU for 2002 was from Germany (45.94% out of the total import from the EU), Italy was second (17.4%). At the same time, in 2001 basic shares of Uzbek imports from the EU came from Germany (43.52%) and France (22.73%). The analysis of the export structure of Uzbekistan to the EU countries in the last years shows that the trade-classification structure of export of Uzbekistan consists of a small number of positions with prevalence of raw goods, while the structure of the import from the EU includes more positions, due to process equipment.

Several regional and national projects will concentrate on new technologies in the energy sector: energy saving, prevention of gas leakages, renewable energy etc.

I.12.2.8 Lifelong Learning Programme (LLL)
Uzbekistan does not participate in programmes such as Comenius, Erasmus, Leonardo da Vinci or Grundtvig. There are however seven ongoing TEMPUS projects and five in the Erasmus Mundus programme. These are: TARGET, MANECA, TOSCA, CENTAURI AND CASIA.

In Uzbekistan, TEMPUS has had a considerable impact on the overall internationalization process of higher education, being the only programme providing long-term intensive inter-university cooperation and improving the universities’ technical infrastructure and computer facilities. Most foreign support in Uzbekistan goes to secondary specialised vocational education, which is at the core of the National Programme for Personnel Training (NPPT).

European Projects for curriculum development were especially important because of their direct links to the NPPT, and in particular with the introduction of the two-level higher education system.

In recent years TEMPUS projects have supported the development of new curricula and courses for master’s and bachelor’s programmes, mainly in the fields of engineering and applied technologies, ensuring their relevance to the local labour market needs through direct involvement of enterprises, branch ministries, Chamber of Commerce and Industry and other non-academic organisations.

Several forthcoming projects on DCI will have a technology component as part of their activities:

193 Information from Europe House of Uzbekistan
194 Information from Europe House of Uzbekistan
I.12.3 Challenges

Uzbekistan has a long established tradition in science, particularly in astronomy, mathematics, medicine and philosophy. It was home to Ulugh Beg, the only astronomer who also ruled a state. It was Ulugh Beg, who built the enormous observatory in Samarkand in 1420. Even today, the country has the third biggest pool of researchers among CIS countries after the Russian Federation and Ukraine: 26,000. Only one out of ten researchers (2,421) works for the Academy of Sciences.

Once the seven priority areas for R&D had been established, scientific institutions and universities were invited to develop seventeen broad research programmes for the period 2008–2018. In parallel, the committee consulted the Academy of Sciences, and ministries and agencies responsible for economic development on which system of competitive bidding to adopt for the selection of research proposals submitted by scientific institutions and universities in areas corresponding to the seven national priorities in R&D. The first round of the selection process took place in 2007 for projects in basic research and the second round in 2008 for projects in applied research and experimental development. Eight basic research programmes consisting of 417 projects were adopted for implementation during 2007–2011. A further seventeen programmes consisting of 591 projects in applied research were implemented during 2009–2011. Eight programmes consisting of 172 projects in experimental development were implemented in 2009 and 2010. As the national budget for research is very low – just 0.20% of GDP in 2010, according to estimates – government funding of selected projects is complemented by foreign and private investment representing 25–30% of the GERD.

The quota for funding allocated to each research programme is fixed by the committee together with the Ministry of Finance. The state budget is assigned by the Ministry of Finance directly to the ‘customers’ who are responsible for each R&D programme or project. These customers may be the Academy of Sciences, the Ministry of Higher Education and the Secondary Specialised Education, the Ministry of Public Health, the Ministry of Agriculture and Water Resources, the Ministry of Public Education or other ministries, leading research centres and other agencies and organisations. It is the committee which monitors the implementation of R&D programmes and projects. In 2006–2008, it was reported that R&D programmes and projects had led to 166 patents. During this period, the number of articles published in international journals in the field of basic research corresponded to the number of articles about applied research. 0.19% of the scientific articles worldwide were contributed to by Uzbek scientists compared to 0.02% contributed to by Kazakhstan.
II Annex – Links to European Websites

Information about the European Research Area (ERA): http://ec.europa.eu/research/era/index_en.htm


EU - Community Research and Development Information Service (CORDIS): http://cordis.europa.eu/home_en.html


FP7 partner search Database: http://cordis.europa.eu/partners/web/guest/home

National R&D and innovation information services: http://cordis.europa.eu/national_service/home_en.html

Monitoring RTDI in European countries: http://erawatch.jrc.ec.europa.eu/

EUROPA INCO Service – Information regarding EU international cooperation in the field of research: http://ec.europa.eu/research/iscp/index.cfm


INCO-NET EECA – S&T International Cooperation Network for Eastern Europe and Central Asian Countries: http://www.inco-eeca.net/

INCO-NET SC/CA – S&T International Cooperation Network for Central Asian and South Caucasus Countries: http://www.inco-casc.net/

INCREASE – Information Exchange in Science and Technology between the European Research Area and Eastern Europe/Central Asia/South Caucasus: http://www.increaseast.eu/


European Research Council (ERC) – reports, statistic, policy documents: http://erc.europa.eu/


European Commission - Joint Research Centre: http://ec.europa.eu/dgs/jrc/index.cfm

European Institute of Innovation and Technology (EIT): http://eit.europa.eu/

European Commission - Research Executive Agency (REA): http://ec.europa.eu/research/rea/

Information about EU’s Competitiveness and Innovation Programme (CIP): http://ec.europa.eu/cip/index_en.htm


Information about the EC development cooperation for ENPI countries (European Neighbourhood Countries): http://www.enpi-programming.eu/wcm/index.php
Development Cooperation Instrument of the EU (e.g. for Central Asian Countries):
http://ec.europa.eu/europeaid/how/finance/dci_en.htm

Information about TEMPUS to modernize higher education in the EU neighbourhood:

Information about ERASMUS MUNDUS (scholarships and academic cooperation):

European Researcher’s Mobility Portal (EURAXESS):
http://ec.europa.eu/euraxess/

Information regarding EU’s growth strategy for the coming decade (Europe2020):

Innovation Union, turning ideas into jobs, green growth and social progress:
http://ec.europa.eu/research/innovation-union/index_en.cfm

Intergovernmental framework for European Cooperation in Science and Technology (COST):
http://www.cost.esf.org/

EUREKA – platform for R&D-performing entrepreneurs in Europe and beyond:
http://www.eurekanetwork.org/

Eurostars - European innovation programme managed by EUREKA:
http://www.eurostars-eureka.eu/

European Science Foundation (ESF):
http://www.esf.org/

Information about science and technology and research policies in Europe (EUROSCIENCE):
http://www.euroscience.org/

IGLO - Association of non-profit R&D Liaison Offices:
http://www.iglortd.org/

Initiative for Science in Europe (ISE):
http://www.initiative-science-europe.org/

European Science Communication and Information Network (ESCIN):
http://www.esf.org/escin/default.htm

Key figures of science, technology and innovation in EU:
http://ec.europa.eu/invest-in-research/monitoring/statistical01_en.htm

EU statistical information service (EUROSTAT):
http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

Links to EU documents, statistics, and other EU related information:
http://europa.eu/documentation/index_en.htm

Information about Intellectual property and technology transfer:

Information about Business and Innovation (European Business Network):

Latest news on RTD - Magazine on European Research:
http://ec.europa.eu/research/rtdinfo/index_en.html

Information on Science, Technology and Innovation in Europe (ScienceEurope):
http://www.scienceineurope.net/
IncoNet EECA is a project funded under the 7th European Framework Programme for research – Project number 212226
www.inco-eeca.net

IncoNet CA/SC is a project funded under the 7th European Framework Programme for research – Project number 244417
www.inco-casc.net

www.increase.eu

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April 2012