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White Paper

on Opportunities and Challenges in View of Enhancing the EU Cooperation with Eastern Europe, Central Asia, and South Caucasus in Science, Research, and Innovation



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List of Abbreviations

AC	Countries associated to FP7	CIS	Commonwealth of Independent States	GIZ	Association for International Cooperation, Germany	OECD	Organisation for Economic Cooperation and Development
AB	Asian Development Bank	CNRS	Centre National de la Recherche Scientifique, France	HEI	Higher Education Institute	OMC	Open Method of Coordination
AGEPI	State Agency on Intellectual Property, Moldova	COST	European Cooperation in Science and Technology – one of the longest-running European instruments supporting cooperation among scientists and researchers across Europe	HES	Higher Education Sector	PCA	Partnership and Cooperation Agreements
AITT	Agency on Innovation and Technology Transfer, Moldova	CRDF	Independent non-profit organisation for promotion of international scientific and technical collaboration through grants, technical resources, and training	HSTC	High Scientific Technology Committee	PSC	Policy Stakeholder Conferences
AM	Armenia	DCI	Development Cooperation Instrument	ICT	Information and Communication Technology	R&D	Research and Development
ASM	Academy of Science of Moldova	EECA	Eastern European and Central Asian countries	IFAD	International Fund for Agricultural Development	RFBR	Russian Foundation for Basic Research
AZ	Azerbaijan	EN	European Neighbourhood	IFAS	International Fund for Saving the Aral Sea	RFH	Russian Foundation for the Humanities
BellSA	Belarusian Institute of System Analysis and Science & Technology Sphere Information Support	ENPI	European Neighbourhood and Partnership Instrument	INCO-NETs	International Cooperation Networks – instrument for increasing the cooperation between the EU and third countries in the field of STI	RTD	Research and Technological Development
BES	Business enterprise	EIP	European Innovation Partnership	InExCB-Kz	Independent Expert Consulting Board-Kazakhstan	RUS / RF	Russia / Russian Federation
BILAT RUS	EU project focused on enhancing the bilateral S&T partnership between the Russian Federation and the European Commission, the EU Member States, Candidate Countries and other countries associated to FP7 (AC)	ERA-NETs	Main EU instrument for the coordination of research funding carried out by Member States and associated countries at national and regional level	IPR	Intellectual Property Rights	S&T	Science and Technology
BILAT UKR	EU project focused on enhancing the bilateral S&T partnership between Ukraine and the European Commission, the EU Member States, Candidate Countries and other countries associated to FP7 (AC)	ERC	Economic Research Centre, Azerbaijan	ISO	International Organization for Standardization	SME	Small and Medium-sized Enterprises
BMBF	Federal Ministry of Education and Research, Germany	EU	European Union	ISTC	International Science and Technology Centre	SRNSF	Shota Rustaveli National Science Foundation, Georgia
BY	Belarus	EU MS	European Member States	JPI	Joint Programming Initiative	STI	Science, Technology, and Innovation
CACAARI	Central Asia and Caucasus Association of Agricultural Research Institutions	EUREKA	European research initiative with the goal of motivating international co-operation in industrial oriented R&D	KG	Kyrgyzstan	SWOT	Strengths, Weaknesses, Opportunities and Threats
CACILM	Central Asian Countries' Initiative for Land Management	FP7	7th European Framework Programme for RTD	KZ	Kazakhstan	TJ	Tajikistan
CASC	Central Asia and South Caucasus	GDP	Gross Domestic Product	LLP	Lifelong Learning Programme	TM	Turkmenistan
CGIAR	Centres of the Consultative Group for International Agricultural Research Competitiveness and Innovation Framework Programme	GE	Georgia	MD	Moldova	UA	Ukraine
CIP	Centres of the Consultative Group for International Agricultural Research Competitiveness and Innovation Framework Programme	GEF	Global Environmental Facility	MSE/MES	Ministry of Science and Education/ Ministry of Education and Science	UK	United Kingdom
		GERD	Gross Domestic Expenditure on R&D	NAS	National Academy of Sciences	UNDP	United Nations Development Programme
				NCP	National Contact Points	UNECE	United Nations Economic Commission for Europe
				NIP	National Information Points	UNESCO	United Nations Educational, Scientific, and Cultural Organization
				NSI	National System of Innovation	UZ	Uzbekistan
						WIPO	World Intellectual Property Organization

Executive Summary

The European Union (EU) and the Eastern European and Central Asian countries (EECA) share the common goal of achieving political, economic and social stability and prosperity. Knowledge based economies are considered keys to success in both regions. Overarching policy objectives in the European Union are expressed in recently adopted strategies and most prominently in the EU's Europe 2020 strategy for smart, sustainable and inclusive growth with the European Innovation Union being one of its flagship initiatives. On the side of EECA prominent examples of knowledge and innovation based strategies are the Russian "Strategy for the Development of Science and Innovation in the Russian Federation for the Period until 2015", the upcoming "National Strategy on S&T until 2020" of the Republic of Moldova or the "Development Strategy until 2030" of the Kazakh Republic.

For achieving the aforementioned policy objectives under thriving international framework conditions, political, economic as well as cultural cooperation is considered as a critical success factor by the EU and the countries in EECA. Cooperation between individual countries or institutions in both regions is supported by a number of strategic policy umbrellas (such as the European Neighbourhood Policy, the Eastern Partnership, the Four Common Spaces with Russia and the recently adopted EU-Russian Partnership for Modernization, as well as the Central Asian Strategy of the EU), which systematically strengthen the political and economic ties between the regions.

Scientific research and technological development (RTD) is a backbone of any knowledge based economy and an indispensable asset for responding to the global challenges which affect – directly or indirectly – all of us. Bilateral and multilateral cooperation in the field of RTD is moreover essential to make optimum use of each other's academic strengths, to share respective resources and to prepare the ground for a joint transfer of scientific results into innovative applications for national, regional and worldwide markets. Although the cooperation in Science, Technology and Innovation (STI) between the EU and the EECA partner countries is quite strong, there is still room for further development.

The EU-EECA policy dialogue among stakeholders is essential for the further development of S&T cooperation between the two regions. In that respect, three Policy Stakeholder Conferences bringing together policy makers and representatives of the research communities of both regions have recently been organized (Athens/2009, Moscow/2010, Astana/2011).

As a result of the aforementioned policy stakeholder conferences and at the same time as an input to future dialogue activities between the two regions, the present **"White Paper on Opportunities and Challenges in View of Enhancing the EU Cooperation with Eastern Europe, Central Asia and South Caucasus in Science, Research and Innovation"** was jointly prepared by EU and EECA experts. It is based on a wider stakeholder consultation process involving political decision makers, representatives of the STI administration as well as of the science and innovation communities in the European Union, Countries associated to the EU RTD Framework Programme and Eastern Europe/Central Asian countries, which have been explicitly consulted through missions to EECA countries or through expert workshops on subjects of relevance for the EU-EECA STI cooperation. Furthermore, the White Paper integrates extensive desk research and has been consolidated in a dedicated policy stakeholder conference in Warsaw (November 2011)¹.

The White Paper is divided in three parts:

The first part (*'State of Affairs of Science, Technology and Innovation Policies'*) summarises the present trends in STI policy in the EU, in Central Asia, in the European Neighbourhood region and in the Russian Federation, focussing in particular on the status of international cooperation in STI and its institutional environment.

The second part (*'Challenges and Recommendations on Enhancing EU-EECA STI Cooperation'*) is organized in five main themes, namely 'Adjusting and Implementing Policy Strategies', 'Strengthening Research Performing Institutions', 'Strengthening of Human Resources', 'Strengthening the role of the Private Sector' and 'Strengthening the sub-Regional cooperation'. It identifies a series of challenges to address and

provides recommendations to stakeholders, i.e. policy makers, policy-delivery services, scientific personnel and the private sector from both regions, on how to better address the challenges including options for advanced EU-EECA STI cooperation in addressing them.

The third part proposes a *'Short-term implementation scenario'* summarizing some suggestions addressed to specific groups of stakeholders which can be implemented by utilising the existing cooperation instruments.

In addition, comprehensive individual country reports are included in the Annex, presenting the S&T landscape and trends in each EECA country focussing in particular on challenges in the field of international cooperation in STI.

The aforementioned *'Challenges and Recommendations'* constitute the core part of the White Paper, are organized in five main themes and can be summarised as follows:

1. Adjusting and Implementing Policy Strategies

There are several challenges directly related to strategic policy-making and good governance, such as generating, accessing and using data and knowledge for evidence-based policy making, embedding STI policy and policy-delivery in a broader, mutually aligned strategic policy system, building appropriate and internationally compatible national legal and ethical frameworks, strengthening the institutional fabric of the STI policy-delivery systems with efficient tools and instruments, securing a sufficient financial allocation to the STI sector, identifying and addressing global and societal challenges, and making optimum use of international cooperation.

It is suggested under this theme to focus on supporting strategic STI policy making; implementing a series of mutual learning exercises; improving existing international STI cooperation frameworks at national level; and contributing to exchange and coordination activities at international and global level.

2. Strengthening Research Performing Institutions

In order to make objectives related to international S&T cooperation attainable, research performing institutions have to be in the material and immaterial position to efficiently perform their duties, to adjust to changing demands of the society and economy and to possess capacities and capabilities needed for international S&T competition and cooperation.

It is suggested to strengthen research performing institutions through their involvement in international benchmarking exercises and twinning activities, which contribute to the adoption of good practices; to strengthen their strategic and operational capabilities through trainings and application of SWOT, Balanced Score Card (BSC) or foresight exercises; and to establish and implement roadmaps, investment plans and management concepts for an improved development and exploitation of research infrastructures.

An essential element for any research performing institution is its human potential which is specifically addressed in the next theme.

3. Strengthening Human Resources

Human capacity building is a particular challenge for all countries, especially in front of societal and economic transformation processes which require also an improved quality of communicating science to society. A particular international challenge is the adjustment of frameworks for international mobility.

In that respect it is suggested to set-up joint training and twinning activities, especially targeting young researchers; to further align scientific education schemes based on Bologna principles; to establish instruments for a more balanced mobility for students and researchers, e.g. through regional doctoral programmes; to further facilitating the issuing of scientific visa; to implement an EU-EECA Year of Science and to promote science communication.

4. Strengthening the Role of the Private Sector

The engagement of the private sector in R&D is a challenge not only in EECA but also in several EU Member States. This is closely connected to the setting-up of appropriate framework conditions, for instance in the field of international standardisation, with the ultimate goal to increase the number of innovative companies.

It is suggested to initiate joint training courses on innovation management as well as mutual learning activities on stimulating the creation and nurturing of innovative companies and framework setting for a higher private engagement in STI, for instance through an enhanced involvement of the private sector in policy dialogue processes; to provide linkages between industrial related R&D initiatives and similar structures in EECA and to establish joint competitive innovation funding programmes; to improve the con-

¹ Activities organized in the context of projects funded by the European Commission (FP7) and dedicated to the support of the EU – EECA policy dialogue: "S&T International Cooperation Network for Eastern European and Central Asia – INCO-NET EECA", "S&T International Cooperation Network for Central Asia and South Caucasus – INCO-NET CA/SC" Enhancing the bilateral S&T Partnership with the Russian Federation (BILAT-RUS), Enhancing the bilateral S&T Partnership with Ukraine (BILAT-UKR), Linking Russia to the ERA: Coordination of MS/AC S&T Programmes towards and with Russia (ERA-NET RUS), Networking on Science and Technology in the Black Sea Region (BS-ERA.NET).

Executive Summary

ditions for investments in innovation and to encourage EU-EECA cooperation in this respect.

5. Strengthening sub-Regional Cooperation

A distinctive challenge of the EECA region is to reduce its fragmentation and to increase critical mass through sub-regional cooperation.

Thus, it is suggested to strengthen sub-regional policy coordination and to stimulate networking between the STI communities, as well as to investigate the possibility of establishing regional centres of excellence.

It goes without saying that many of these suggestions extend into the autonomous competences of state authorities and research performing organisations. The White Paper does not intend to interfere with autonomous decision-making processes but to contribute to the knowledge base of the international STI cooperation between EU and EECA countries with an informed input that takes into account the international perspectives of different regions and countries. Many of the suggested intervention areas necessitate well planned and long-term efforts, since international STI cooperation needs a stable supportive framework to unfold its synergetic and self-energizing potentials. Therefore, this White Paper further proposes to interested STI policy stakeholders in EU Member States and EECA countries to develop a medium-term **joint roadmap for enhanced STI cooperation** to be built on common goals for mutual benefit and to be implemented in partnership through joint instruments. In this regard, the European Strategic Forum for International Cooperation (SFIC) might play a distinguished role by launching a new SFIC-Pilot Activity, thus inviting EECA partner countries to join the dialogue and monitor up-coming activities. The process of developing a joint roadmap needs to include wider stakeholder consultations in particular with the science community and the private sector in both regions. In addition, cross-sector policy coordination should be built in to properly embed STI policy in comprehensive governmental strategies at transnational level tackling societal and global challenges.

Existing programmes like the EU RTD Framework Programme, the European Neighbourhood Policy Instrument (ENPI) and the Development Cooperation Instrument (DCI) as well as ongoing and planned projects developed under the INCO-NET-, BILAT- and ERA-NET-schemes shall be promoted to further support trans-national EU-EECA STI cooperation. Particular emphasis should be given to exploit options for complementing funds from the EU with funds from other international financial institutions such as the Asian Development Bank, the World Bank and the European Bank for Reconstruction and Development, as well as with funds from the countries in the EECA region.



1. Introduction: Rational for a Closer EU-EECA Cooperation

The European Union (EU) and the Eastern European and Central Asian countries (EECA) share the common goal of achieving political, economic and social stability and prosperity. Democratic societies and knowledge based economies are considered respective keys to success. Overarching policy objectives at national and regional level in the European Union and the EECA region are expressed in recently adopted strategies, most prominently the EU's Europe 2020 strategy for smart, sustainable and inclusive growth with the European Innovation Union being one of its flagship initiatives. At the EECA side prominent examples for corresponding strategies are the Russian "Strategy for the Development of Science and Innovation in the RF for the Period until 2015", the upcoming "National Strategy on S&T until 2020" of the Republic of Moldova or the "Development Strategy until 2030" of the Kazakh Republic.

For achieving those policy objectives among others the utilization of benefits of political and economic as well as of cultural cooperation is considered a critical success factor by both the EU and the countries of EECA. Along that line, the international opening-up of national systems supported by respective policy measures are usually integral part of any national or regional strategy. Apart from the traditional measures to deepen the relations between individual countries and institutions of both regions a number of strategic policy umbrellas were launched such as the European Neighbourhood Policy, the Eastern Partnership, the Four Common Spaces with Russia and the recently adopted EU-Russian Partnership for Modernization, the EU-Ukraine Association Agenda, as well as the Central Asian Strategy of the EU, to systematically strengthen the political and economic ties between the regions.

Scientific research and technological development (S&T) are considered a backbone of any knowledge based economy and an asset for responding to the recent global challenges. Bilateral and multilateral cooperation in the field of S&T is moreover essential to make optimum use of each others academic strengths, to share respective resources and to prepare the ground for a joint transfer of scientific results into innovative applications for national, regional and worldwide markets. Although the S&T cooperation between the EU and the EECA partner countries is quite strong there is still much room for its further

development. Acknowledging the current global as well as societal challenges both regions are facing, new perspectives for the strategic S&T partnership between the EU, Countries associated to the European RTD Framework Programme and the EECA region should be developed, building on each others' strengths and on common policy objectives such as:

- creation of synergies by linking the scientific potential of leading researchers and innovators in partnership;
- ensuring mutual access to unique S&T infrastructure and pooling resources for establishing new S&T infrastructure;
- removing still existing barriers for S&T cooperation and for joint innovation activities;
- pooling resources for jointly addressing global challenges such as climate change, sustainable use of global resources, food security, ageing societies, global health threats; and
- reinforcing industry driven partnerships and exploitation of markets, to stimulate knowledge driven innovation.

Furthermore, the EU-EECA partnership should encourage the close alignment of public and private sector initiatives in order to increase and accelerate the dissemination and exploitation of research results, and could thus build the framework for creating an advanced EU-EECA innovation partnership. Evidently, many obstacles need to be removed to progress towards these objectives.

EU-EECA policy dialogues in the sphere of STI are considered a key to jointly address the aforementioned objectives and to achieve the goals of creating knowledge-based sustainable and inclusive growth in both regions through raising the full potential of real partnership. Much dialogue is already going on – both among individual EU member states and individual EECA countries and among the European Commission and individual EECA countries. Usually there are policy umbrellas created, most prominently in terms of bilateral governmental agreements on S&T cooperation among individual countries, as well as Partnership and Cooperation Agreements and dedicated agreements on S&T cooperation between the European Union and EECA countries. However, there is room for increasing the impact of such dialogues and for exploiting the available interests, among oth-

ers through the identification of options for a closer coordination of various activities.

In support of dialogue processes among policy stakeholders as well as of the science and innovation communities and for fostering practical cooperation among interested institutions, two bi-regional S&T projects between the EU and EECA (INCO-NET EECA and INCO-NET CASC) are funded by the European Commission within the 7th European RTD Framework Programme. They are implemented in bi-regional ownership by larger project consortia consisting of a range of interested institutions from EU member states, countries associated to the present EU RTD Framework Programme and EECA countries. Both INCO-NETs strongly inform and support the bi-regional policy dialogue aiming among others to identify opportunities and priorities for joint action. To prepare a better ground for such policy dialogues, analytical results had been delivered such as on EU-EECA S&T cooperation patterns and on strategic research areas of mutual interest with potential for future cooperation and enhanced coordination between the EU Member States and EECA countries.

The EU-EECA policy dialogue among stakeholders is essential for the further development of S&T cooperation between the two regions. In that respect, three Policy Stakeholder Conferences bringing together policy makers and representatives of the research communities of both regions have recently been organized (Athens/2009, Moscow/2010, Astana/2011).

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gramme and Eastern Europe/Central Asian countries, which have been explicitly consulted through missions to EECA countries or through expert workshops on subjects of relevance for the EU-EECA STI cooperation. Furthermore, the White Paper integrates extensive desk research and will be consolidated in a dedicated policy stakeholder conference in Warsaw (November 2011)¹¹.

The White Papers particularly aims to:

- present the current state of STI and STI policies in the relevant regions (strengths, weaknesses, opportunities, threats) as well as aspects of trans-sector policy coordination and its contributions to national/regional development;
- reflect on the state of regional cooperation and its institutional environment;
- present benefits of an enhanced international STI cooperation;
- recommend knowledge-based policy approaches to better address national/regional challenges incl. options for advanced EU-EECA STI cooperation.

The **White Paper** is divided in three main chapters. The first chapter – State of Affairs – outlines the current state of STI in the EU, Central Asia, the European Neighbourhood Region and the Russian Federation, incl. an outline of the role of international cooperation. Within the second chapter "Challenges and Recommendations on Enhancing EU-EECA STI Cooperation" common policy strategies, instruments for its implementation and the respective framework conditions are described in detail. Building on these findings, major policy challenges are highlighted and recommendations are formulated for developing a joint EU-EECA STI Cooperation Strategy. Along the line of the recommendations, the last chapter "Short-term Implementation Scenario" suggests an ad-hoc Joint Action Plan for different groups of stakeholders.

¹¹ Activities organized in the context of projects funded by the European Commission (FP7) and dedicated to the support of the EU – EECA policy dialogue: "S&T International Cooperation Network for Eastern European and Central Asia – INCO-NET EECA", "S&T International Cooperation Network for Central Asia and South Caucasus – INCO-NET CASC" Enhancing the bilateral S&T Partnership with the Russian Federation (BILAT-RUS), Enhancing the bilateral S&T Partnership with Ukraine (BILAT-UKR), Linking Russia to the ERA: Coordination of MS/AC S&T Programmes towards and with Russia (ERA-NET RUS), Networking on Science and Technology in the Black Sea Region (BS-ERA.NET).



2. State of Affairs of Science, Technology, and Innovation Policies

2.1 European Union

Current State of S&T in the European Union

S&T Indicators

This section focuses on the European Union **at community level** and concentrates on data, initiatives, strategies, programmes etc. at European level, often triggered by the European Commission. It goes without saying that the EU is more than just the sum of its 27 Member States and that in the field of R&D - like in other policy areas - large discrepancies can be found among the EU Member States. While some of the Member States belong to the world leaders in R&D, the EU in total is still under-investing, spending every year 0.8% of GDP less than the US and 1.5% less than Japan on R&D, with major gaps in business R&D, venture capital investments, knowledge-intensive service sector etc². R&D as % of GDP in the EU was 2.01% in 2009, which is considerably higher than in the EECA countries, but lower than that of some of the EU's global market competitors (e.g. Japan: 3.44% in 2007; USA: 2.76% in 2008). In the EU-27, 55.0% of R&D expenditure was financed by the business enterprise sector (BES) and 33.5% by public sources (GOV). Only three EU Member States have two thirds of R&D expenditure financed by the BES. In terms of R&D performance, the BES accounted for 64% of the EU's R&D expenditure, followed by the higher education sector (HES) (22%) and the governmental research sector (13%) in 2008.

In 2008, around 2,250,000 researchers (head count) were engaged in the EU. The number of researchers continuously increased in the last years (+ 38% compared to 2000)³. Although this is an impressive absolute figure, the number of researchers in Europe as a share of the population and labour force is well below that of the US, Japan and other countries.

In the EU-27, 45.9% of researchers (in FTE) were employed in the business enterprise sector in 2008, 40.4% in the HES and 12.5% in the government sector⁴. Female researchers are still underrepresented (32% of all researchers in the EU in 2008), especially in the BES (19% in 2008). Moreover, many researchers will retire over the next decade. If the EU wants to reach the R&D target quota of 3% by 2020, much more research jobs need to be created; young people must be attracted and trained to become researchers and internationally competitive research careers to keep them in Europe and to attract the best from abroad must be secured. But there are also some positive signals: the EU-27 produced twice as many doctoral graduates as the US and over the period 2000-2005, the number of doctoral graduates grew more in the EU than in the US and Japan⁵.

International mobility, especially between EU Member States, is high. Intra-European mobility barriers are more and more reduced. There is still a relative "brain drain" of European researchers to the US. The Marie Curie fellowships under the European Research Framework Programme are playing an important role to strengthen the skills development, mobility and careers of researchers across borders. To facilitate researchers' mobility, the EC published a 'European Charter for Researchers' and a 'Code of Conduct for the Recruitment of Researchers', however, with limited direct impact.

Research Structure and Policy

At European level, science and technology policies needed a couple of decades to develop. In 1971, **the first milestone in European R&D**, the **COST** programme, was implemented. In 1985, **EUREKA** was established by a Conference of Ministers of 17 countries and the European Commission. At com-

TABLE 1: S&T INDICATORS FOR THE EUROPEAN UNION⁶

Country	R&D expenditure as % of GDP (GERD)	Number of research organisations	Number of R&D personnel (head count)
EU	2.01	n/a	3,047,825

² Data taken from "Europe 2020 Flagship Initiative Innovation Union", published by EC (SEC(2010) 1161).

³ Eurostat, <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tsc00003&plugin=1> accessed on 8 September 2011.

⁴ Eurostat (2011): Science, technology and innovation in Europe. Eurostat pocket books.

⁵ EC (2008): A more research-intensive and integrated European Research Area. Science, Technology and Competitiveness key figures report 2008/2009.

⁶ Data from EUROSTAT, accessed on 8 September 2011

munity level, S&T was not legally institutionalised as a preferential policy area of the EU until Title VI of the **Single European Act** came into force in 1987. Already in 1985, however, the European Commission suggested the aggregation of the budgets of some of the EU's already existing R&D initiatives (e.g. ESPRIT) into one 'envelope', which was the start of the European Framework Programme for RTD. Today it is the largest competitive R&D funding programme globally. Within the ongoing 7th **European Framework Programme for RTD** (with a budget of 54b) a broad portfolio of several different instruments has been made available to support the competitiveness of European industries and the well-being of EU citizens.

In 2000, the European Council launched the '**Lisbon Strategy**' aimed at transforming the EU by 2010 into 'the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion'. In 2002, a further aim was added in Barcelona, namely to spend by 2010 at least 3% of the GDP on research, of which two thirds should be financed by the BES. All these ambitious goals could not be reached. The new EU growth strategy for this decade is the "**Europe 2020**" strategy, which has set five ambitious objectives on employment, innovation, education, social inclusion and climate/energy to be reached by 2020. The 'old' Barcelona target, namely to invest 3% of the EU's GDP in R&D is the most obvious "Europe 2020" R&D goal. To facilitate the attainment of the set objectives, 7 flagship initiatives were created, among them the "**Innovation Union**" being most relevant for R&D and innovation. With over thirty action points, the Innovation Union aims to improve conditions and access to finance for research and innovation in Europe, to ensure that innovative ideas can be turned into products and services that create growth and jobs.

It has been agreed to **tackle unfavourable framework conditions** to facilitate private investment in R&D and innovation, to avoid fragmentation of efforts by creating a true European Research Area, to focus on innovations that address the major societal challenges identified in Europe 2020, to pursue a broad concept of innovation, and to involve all actors and all regions in the innovation cycle (incl. 'social innovation' and 'smart regional specialisation'). The whole chain of R&D and innovation should be strengthened and made more coherent, from blue-sky research to market uptake. This should also be reflected in EU

funding programmes. Therefore, as of January 1, 2014, 'Horizon 2020' will bring together research and innovation funding currently provided through the European Framework Programme for Research and Technical Development, the Competitiveness and Innovation Framework Programme (CIP), and the European Institute of Innovation and Technology (EIT). Under "**Horizon 2020**" priority will be given to enabling technologies ('eco', 'nano', 'bio' and 'info') and on addressing societal, mostly global challenges (e.g. 'green' energy, transport, effects of climate change and ageing).

By delivering the **European Research Area** by the end of 2014, costly overlaps and unnecessary duplication in R&D at different regional levels should be avoided. Starting points have been identified in the fields of human resources, research programmes, research infrastructures, knowledge sharing and international S&T cooperation.

From the beginnings of the development of Community research policy it has been recognised that it should be based on two pillars: the **coordination of national policies and the joint implementation of projects of interest to the Community**. This principle is integrated into Article 181 of the Treaty on the Functioning of the European Union, where it is stated that the Community and the Member States shall coordinate their research and technological development activities so as to ensure that national policies and Community policy are mutually consistent and the EC may take any useful initiative to promote the coordination in close cooperation with the Member States.

Practically, the main **driver for R&D** and innovation at Community level is the European Commission (EC), in particular DG Research and Innovation, which is responsible for developing and implementing the European research and innovation policy with a view to achieving the goals of Europe 2020 and the Innovation Union. Among the other directorates, DG Enterprise and Industry, DG Information Society and Media, and DG Education and Culture are mostly involved in R&D and innovation. To contribute to the realisation and better governance of the European Research Area, the so called '**Ljubljana Process**' was launched in May 2008 to develop a common vision and effective governance of the European Research Area. In 2010, ERAC (European Research Area Committee, formerly CREST) has been endorsed as the most strategic policy advisory body whose function

is to assist the EC and the Council of the European Union in performing the tasks incumbent on these institutions in the sphere of R&D.

The EC has its own **joint research centre (JRC)**, providing scientific advice and technical know-how to support a wide range of EU policies. Its status as a Commission service guarantees independence from private or national interests. The JRC has seven large scientific institutes with a wide range of laboratories. The JRC employs around 2,750 staff members coming from throughout the EU, and its budget comprises €30 million annually, coming from the EU's research budget. Further income is generated through the JRC's participation in indirect actions, additional work for Commission services and contract work for third parties. The bulk of research organisations engaged at the European level, however, originates from the individual EU Member States. Until May 2011, more than 71,000 participations⁷ in more than 12,500 FP7 projects have been funded. In absolute numbers most active in FP7 are research organisations from Germany, UK, France, Italy, Spain, the Netherlands, Belgium, Sweden, Greece, and Austria.

With respect to **scientific excellence**, expressed as number of scientific publications, the EU is the largest producer of scientific publications in the world (37.6% of the world peer-reviewed scientific articles). However, the EU contributes much less than the US to high-impact publications and is not specialised in the faster-growing scientific disciplines.

In terms of **patent** applications there has been some increase in EU-27 inventiveness in the last decade. PCT⁸ patent applications with EU-27 inventors increased in number somewhat more rapidly than those with US inventors, but less rapidly than those from Asian countries. Japanese and US inventions are concentrated to a higher degree than those from the EU in enabling technologies (biotechnology, ICT and nanotechnology). Regarding IPR, the burdensome process of establishing a single EU Patent has become a symbol for Europe's failure on innovation.

Although in the EU (excluding Greece), 51.6% of the enterprises in industry and services reported innovation activity between 2006 and 2008, the **innovation performance** of the EU lags behind some of its major global competitors. The annual high-tech trade balance is usually negative and the share of high-tech exports of the EU in % of total exports is shrinking compared to ten years ago⁹. In terms of world-market shares of high-technology exports, the EU has 16.7% (2008), which is clearly behind China (21.5%), but ahead of the US (14.1%), Hong Kong, and Japan. Within the EU-27, Germany is the leading exporter of high-tech products. In terms of global export shares, the EU was in the lead in numerous product groups such as 'Aerospace', 'Chemistry', 'Non-electrical machinery', 'Pharmacy' and 'Scientific instruments', whereas the United States ranked first only in 'Armament'. China was the world's foremost exporter in the 'Computers-office machines' and 'Electronics and telecommunication' product groups, while other Asian countries were leading exporters of 'Electrical machinery'.

To battle the European paradox, i.e. the conjecture that EU countries play a leading global role in terms of top-level scientific output, but lag behind in the ability of converting this strength into wealth-generating innovations¹⁰, European policies recently started to promote **demand-side measures to complement supply-side R&D measures**. In addition, there is agenda setting on regulations and standardisation to forward R&D and innovation. Smart and ambitious regulation, e.g. stricter environmental targets and standards, is considered particularly important for eco-innovation. The EU wants to maintain and further reinforce its impact on the setting of standards at global level, where other countries are increasingly seeking to set the rules. Pre-commercial procurement to support innovations is another topic which recently popped up, but yet little public procurement in the EU is aimed at innovation, despite its high theoretical potential.

⁷ These participations are not necessarily from different organisations. The number of single discrete R&D organisations is significantly below the number of participations.

⁸ i.e. an international patent application under the Patent Cooperation Treaty (PCT).

⁹ Source: <http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=0&language=en&pcode=tgite210&tableSelection=1>, accessed on 8 September 2011

¹⁰ Definition from Dosi, G., Llerena, P. and Labini, M. S. (2005). Science-Technology-Industry Links and the "European Paradox": Some Notes on the Dynamics of Scientific and Technological Research in Europe. Working Papers of BETA 2005-11, Bureau d'Economie Théorique et Appliquée, UDS, Strasbourg.

State of International Cooperation

Community Policies and Community Programmes

At Community level, international S&T cooperation with countries outside the EU has become an integral part in any European Framework Programme for RTD since FP3. Moreover, also COST and EUREKA begun early to facilitate international S&T cooperation. In 2008, the EC published "A Strategic European Framework for International Science and Technology Cooperation". The principles of this strategy are to widen the ERA and to make it more open to the world, to ensure coherence of policies and complementarity of programmes, to foster strategic S&T cooperation with key third countries, to develop the attractiveness of Europe as a research partner and to launch result-oriented partnerships on information society regulations. All these principles should be approached as a combined effort of the EC and the EU Member States. To better align and coordinate S&T internationalisation efforts between the Community and the Member States level a dedicated working group under CREST was established in 2007, whose recommendation to establish a formal Strategic Forum for International S&T Cooperation (SFIC) was taken up, which started its operations in 2009.

At the operational level, a comprehensive portfolio of instruments has been developed under FP7 to enhance international R&D cooperation. Most importantly, FP7 is open to participation from third country partners. Community funding is normally limited to participants from international cooperation partner countries (ICPC; i.e. 139 countries from all over the world, except some post-industrialised high-income countries like Japan or Singapore). R&D organisations from ICPC can now participate in almost all calls for proposals launched under FP7 and receive funding for their efforts. Moreover, in the 'Capacities' section of FP7 a few more dedicated instruments have been developed to support international R&D cooperation. Today, the instrumental portfolio encompasses international ERA-NETs, INCO-NETs, INCO-Labs, ERA-Wide, BILAT projects, etc.

Despite all these efforts and the existence of a full-fledged instrumental international S&T cooperation portfolio, the share of participation from third countries did not significantly increase compared to the previous FPs.

Bilateral Agreements and Programmes

The EC has a number of bilateral S&T agreements with key partner countries in place. Among the EECA, bilateral S&T agreements have been concluded with the Russian Federation and the Ukraine. EC bilateral S&T agreements are based on the principles of equitable partnership, common ownership, mutual advantage, shared objectives and reciprocity. In addition, bilateral measures are tested and implemented within FP7 such as 'coordinated calls', 'joint calls' or the 'twinning' instrument.

(Sub-)Regional Cooperation

S&T cooperation with the EU's neighbours is explicitly featured in the EC's strategic document "A Strategic European Framework for International Science and Technology Cooperation". A certain emphasis was placed on FP7 association, which became true for instance for most Western Balkan Countries, while the EU position towards the Russian and Ukrainian request for FP7 association was significantly more reluctant, also caused by non-S&T policy issues. The opportunity for European Neighbourhood Partner Countries to participate in certain EC policies and programmes, including FP7, is an important aspect of the European Neighbourhood Policy (ENP).

European Agreements (PCA, S&T) and Programmes (FP, ENPI, DCI, CIP-EEN)

Agreements and implementing programmes between the EU and the EECA as well as the Russian Federation are described in the respective Central Asia, European Neighbourhood Countries and Russia sections.

Summarising the most important developments, the EU launched Partnership and Cooperation Agreements (PCA) with the Central Asian countries that also provide an umbrella for cooperation in the scientific field already in the 1990s. Moreover, the EU has strengthened its relationship with the whole region since the adoption of "**The EU and Central Asia: Strategy for a New Partnership**" by the European Council in June 2007.

The **Development Cooperation Instrument** (DCI) (2007-2013) is a programme for poverty reduction, sustainable economic and social development and the integration of Central Asia into the world economy supported by the EU with 719 million. In general, DCI projects are not targeted to special research topics, but some of the DCI priority activities benefit from scientific knowledge generation or recognise

the development of scientific research and research infrastructures.

The thematic interest of CA institutions in participating in **FP7** is very wide, but in fact only 34 Central Asian organisations took part in different S&T projects within the FP7 (until May 2011). With the aim to enhance the participation of Central Asia in the FP7, **National Contact Points** (NCP) were created in Kazakhstan, Kyrgyzstan and Uzbekistan.

With respect to the **European Neighbourhood countries**, all - except Belarus - have **Partnership and Cooperation Agreements (PCAs)** with the EU. These form the legal basis for EU relations with each country. The PCAs establish the institutional framework for bilateral relations, set the principal common objectives and call for activities and dialogue in a number of policy areas including S&T.

All EN countries participate in the 7th **EU RTD Framework Programme** as International Cooperation Partner Countries (ICPC). The association of Moldova will go into force on 1st January 2012. Until the end of 2010, the majority of countries had a quite limited number of successful proposals in FP7.

The **European Neighbourhood Policy (ENP)** covers all European Neighbourhood countries. For each country tailor-made ENP Action Plans have been drafted taking on board differing national needs. With regards to STI, a common goal for all countries is closer integration to the ERA through more active participation of domestic research organisations in the EU Framework Programmes for RTD.

All EN countries are also involved in the **Lifelong Learning programmes** (LLP) and in particular in TEM-PUS, where these countries achieve a high success rate. Very intense relations have been established with **Russia**. Russia, which has concluded an S&T agreement with the European Commission for the first time in 1999, implements several "co-ordinated calls" with the EU, which are jointly defined and funded. Since 2001, S&T agreements between the EU and Russia have also been in place for **EURATOM** covering fission as well as fusion-oriented research.

Another framework for intensifying cooperation had been agreed in 2003 with the "**four common spaces**", which comprise a common space of research and education, including cultural aspects. Hereunder

a series of measures to facilitate Russia's integration into the European Research Area are implemented. Russian scientists participate also in projects of the European initiatives **COST** and **EUREKA**.

Through the **International Science and Technology Centre** (ISTC), founded in 1992 as an international organisation by the USA, Japan, Russia, and the EU, substantial support to the former Soviet Union R&D sector is provided with the aim to redirect their talents to scientific peaceful activities.

Russia is also one of the target countries in the **EU Eastern Partnership and the Northern Dimension initiatives**. The latest joint EU-Russia initiative is a "**modernisation partnership**", agreed in spring 2010. It includes cooperation in R&D and innovation.

2.2 Central Asia

Current State of S&T in Central Asia

S&T Indicators

Funding for R&D in the five countries of Central Asia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, is generally low and ranges from 0.06% of GDP (TJ) to 0.21% (KG) in 2011 (see Table 2). All five countries have in common that science is largely funded from the state budget. In terms of research organizations, in absolute figures Kazakhstan and Uzbekistan have the highest number of active scientists and research organizations and rank among the highest in the CIS countries (on a similar level as Belarus). Turkmenistan, with its 46 research organizations, is in the process of re-opening some institutions after its previous president had closed the Academy of Science and its research institutions.

Research Policy and Structure of National Science, Technology and Innovation Systems

Science and technology policies are passing through a phase of transition in all countries of Central Asia, especially after their independence from the Soviet Union. In the years following independence, all Governments have taken up concrete measures for the progress and development of S&T in their countries.

Since June 2007 **Kazakhstan** implements the State Programme on Science Development for 2007-2012¹⁷. The main goals of the Programme are the

modernization of the RTD management system, its infrastructure, and its legal background, as well as increasing governmental financial support for RTD. In 2010, the State Programme for Accelerated Industrial-Innovative Development for 2010-2014¹⁸ was adopted as part of the Strategic Plan of Development of Kazakhstan till 2020, which is the second stage of the overall Kazakhstan Development Strategy till 2030. This Programme aims at ensuring sustainable and balanced economic growth through diversification and increased competitiveness. In 2011, Kazakhstan adopted the Law "On Science"¹⁹. The law regulates the relations between science and scientific and technological activities, and foresees a fundamental restructuring of the higher education system and the science system. It furthermore identifies new research funding tools, such as grants for basic research and industry targeted activity.

The legal basis for national S&T policy in **Kyrgyzstan** form the following regulations: Law "On the National Academy of Sciences" from 2002; Law "On Science and Basic State Scientific and Technical Policy" from 2008; Law "On System of Scientific and Technical Policy" from 2005; and the Law "On Innovative Activity" from 1999. The Law „On Science and Innovation Activities" from 2009 describes the management of practical results in directions of the national economic priorities, and the need for development of innovations. Furthermore, in the Country Development

TABLE 2: S&T INDICATORS FOR THE FIVE CENTRAL ASIAN COUNTRIES

Country	R&D Expenditure as % of GDP (GERD)	Number of Research Organisations	Number of Research Personnel
Kazakhstan ¹¹	0.16	424	17,021
Kyrgyzstan ¹²	0.21	84	5,125
Tajikistan ¹³	0.06	67	5,617
Turkmenistan	n/a	461 ¹⁴	3,689 ¹⁵
Uzbekistan ¹⁶	0.20	202	3,4587

¹¹ According to the Kazakhstan Agency for Statistics. www.stat.kz

¹² National Statistic Committee of the Kyrgyz Republic, 2010

¹³ UNESCO Science Report 2010

¹⁴ calculated

¹⁵ Statistical Yearbook of Turkmenistan, Ashgabat, 2010, p.160

¹⁶ Committee for Coordination of Science and Technology Development of Uzbekistan 2010

¹⁷ Presidential Decree of 20.06.2007 N 348 „On State Programme of Science of the Republic of Kazakhstan as 2007 - 2012"

¹⁸ Presidential Decree, Republic of Kazakhstan March 19, 2010 No 958

¹⁹ Presidential Decree, Republic of Kazakhstan, February 18, 2011 No 407-IV

Strategy for 2009- 2011 particular attention is paid to the development of science and innovation, and this strategy sets the research priorities in the fields of S&T for the country.

The government of **Tajikistan** has recently adopted a number of science-related laws, e.g. the Law "On Science and National S&T Policy" in 1998, the Law "On the National Academy of Sciences" in 2002, and a Decree on the Activities of the National Academy of Sciences in 2004. The current National Development Strategy for 2007-2015²⁰ that includes the Science Development Strategy foresees updating the legislative basis of S&T and finding measures to ensure its proper execution. The strategy also aims at further strengthening the collaboration between Tajik research organisations and the different ministries, and outlines a comprehensive programme for developing international scientific cooperation via intergovernmental agreements and partnerships to be concluded by the Academy of Sciences, research institutes, and universities²¹.

In **Turkmenistan**, the Law "On the Status of Scientists" adopted in 2009 defines the rights, duties and responsibilities of researchers, the criteria for evaluation of their qualifications as well as the responsibility of state government bodies to ensure the freedom of academic work, provide social protection for researchers, and raise the prestige of scientific activities.

The S&T and innovation activity in **Uzbekistan** is regulated by the Presidential Decree #436 from 2006 "On measures for further development of coordination and management of science and technology development". In the frame of this Decree, the Committee for Coordination of Science and Technological Development was established, and the responsibilities of the different ministries, the Academy and the research organisations were re-organised. Together with the Decree #31 from 1998 "On state support of international scientific programs, projects in the framework of international and foreign grants", it forms the basis of S&T policy in the country. A Law "On invention" is currently under preparation. Moreover, the year 2011 was declared as the national year of SMEs at the government level.

The research structures responsible for implementing scientific programs, however, vary between the five countries.

In **Kazakhstan**, the main research stakeholder is the High Scientific Technology Committee (HSTC), headed by the Prime Minister of Kazakhstan. The Committee coordinates all ministries of Kazakhstan, which are responsible for research development. Any decision of the Committee has to be approved by the Parliament of the Republic. The S&T policy in Kazakhstan is divided between two ministries, i.e. the Ministry of Industry and New Technologies is responsible for innovation, while the Ministry of Education and Science overlooks the scientific programmes and activities.

For acceleration of S&T development in **Kyrgyzstan**, a Coordination Committee was set up by the President. The main task of this Committee is to monitor the different scientific activities, research and innovations. There are three main stakeholders involved in science: The Ministry of Science and Education (MSE), and the National Academy of Science (NAS KR), which acts as a ministry and advises the government on S&T policy. The NAS KR also defines and coordinates the research activities of the universities and most of the academic institutes, and manages basic research funded by the state. The Agrarian Academy, as the third major player, is a management entity similar to the NAS KR and responds directly to the Cabinet of Ministers.

In **Tajikistan**, the National Academy of Sciences (NAS TJ) is the country's main scientific centre that has an important decision making power in the national S&T policy. In the absence of a Ministry of Research, this function is carried out by the NAS TJ with its president holding a position similar to a minister. The majority of research organisations are administered by the NAS TJ as well as by the National Academy of Agricultural Sciences, and the National Academy of Educational Sciences. In addition, there are a few research institutes and universities that do not belong to the structure of the academies. All universities except the National University are under specific ministries; the National University is independent.

In **Turkmenistan**, in 2009 the Academy of Sciences (NAS TM) was re-opened, and in 2010 the position of the Vice Prime Minister for Science, New Technologies and Innovation was newly established. The Vice Prime Minister is also the President of the Academy of Sciences. A large number of research institutes fall under the supervision of the NAS TM. Yet, specific thematic research institutes are administered directly by the respective ministry, e.g. the Desert Institute under the Ministry of Environment. Also, a new Centre for Science and Innovation is being created, which shall coordinate applied sciences and will be supervised by the NAS TM. Relevant scientific decisions have to be approved by the Committee for Science, Education and Culture in the Parliament of Turkmenistan.

In **Uzbekistan**, the Committee for Coordination of Science and Technological Development under the Cabinet of Ministers is the main governmental body responsible for implementing the state S&T policy and developing priority fields of S&T and international S&T cooperation. It is responsible for the coordination of all research programs of the Academy of Sciences (NAS UZ) as well as the ministries, including the Ministry of Education, and their related research institutes and universities via its Executive Committee. Furthermore, the Committee monitors the implementation of research and innovation projects, and the transfer of their results to the industry. It is also assigned to assist and support Uzbek scientists and engineers to participate in international S&T programmes.

What unites all the countries are their research priorities. Overall, the countries indicated the following national priority fields that should contribute to the socio-economic development of the country:

- Information and communication technologies (KZ; KG; TJ; TM;UZ);
- Agriculture, biotechnology, food security, land and water management (KZ; KG; TJ; TM; UZ); Energy and water technologies, renewable energy resources (KZ; KG; TJ; TM);
- Metallurgy and extraction (KZ; KG; TJ; TM; UZ)
- Environmental protection, safety (KZ; KG; TJ; TM; UZ);
- Health, medicine (KZ; KG; TJ; TM; UZ)
- Oil and Gas sector, i.e. physical and chemical extraction and processing (KZ; TM; UZ)
- Socio-economic policy and economic production, labour (TJ; TM; UZ)

State of International Cooperation

National Policies and National Programmes Addressing International S&T Cooperation

The expansion of international cooperation plays an important role in the implementation of the national S&T strategies in all Central Asian countries. The importance of the international relations is usually regulated in **Presidential Decrees** (UZ, TJ) or in the current **Laws** on Science (KG, KZ, TJ) and "On the Status of Scientists" (TM) (see above). The main national objectives of the Central Asian countries regarding international collaboration include the following aspects: a) exchange of S&T knowledge; b) financial and technical support; c) creation of joint research centres and organisations. The Kazakh State Programme "The Path to Europe" 2009-2011 is the sole international strategy established at the national level. The aim of the programme is to bring the Republic of Kazakhstan to a new level of strategic partnership with leading European countries, especially in technological fields like energy, transport, quality of life, cooperation with SMEs as well as in social sciences and humanities.

Moreover, in some of the countries the cooperative actions in the national laws and strategies are connected to the economic development and promotion of **innovation** in the own country. At that instant, the National programme "Kazakhstan-2020" aims to develop innovative economy by identifying positive trends in Kazakhstan economy (energy efficiency, growth of non-raw material sector; agro-industrial complex; support to SMEs and growth in labour productivity) and using international support for its implementation.

The current discussion about the protection and utilisation of **intellectual property rights** has reached the Central Asian countries as well. Furthermore, an important step in this area is the setting up of a legal basis for the respective training of CA experts. For example, the law "On the status of the scientist in Turkmenistan", adopted in 2009, sets legal basis and makes significant influence on cooperation expansion of the scientists of the country with foreign partners. In Kazakhstan and Kyrgyzstan there are several IPR and Patent Laws (e.g. "On Copyright and Related Rights", "On Employee's Inventions, Utility Models and Industrial", "About trade marks, service marks and designations of places" etc.), which define the legal basis in these countries. The Uzbek government

²⁰ Национальная стратегия развития Таджикистана до 2015 года и стратегия снижения бедности на 2006-2015 года: Стратегия развития науки. (National Development Strategy of Tajikistan until 2015)

²¹ UNESCO Science Report 2010

is currently preparing some additional regulations concerning these topics.

The number of **national programmes** in Central Asia open for foreign researchers is significantly low. In Kazakhstan, the new Law on Science strengthens the participation of foreign researchers in national calls for proposals. Turkmenistan allows foreign participation in national programmes as part of technical assistance. In general, at this current stage the scientific activities include mainly scientists from EECA, but not from other European countries.

Bilateral Agreements and Programmes

Each Central Asian country has signed several bilateral S&T agreements with different EU MS/AC, for example, the Agreement between the Government of Kazakhstan and the Government of Italy on Cultural and Scientific Cooperation (May 11, 2000), or the Agreements between the Government of Kazakhstan and the Governments of Latvia and Estonia on Economic and Scientific-technical Cooperation (March 2006).

Aside from the EU, the countries have built up formal scientific relations with China (KG), South Korea (UZ), USA (UZ, TJ) or Afghanistan, Iran, Pakistan, and India (TJ). They traditionally cooperate very closely with the other countries of the Former Soviet Union like Armenia, Belarus, Russia etc. Besides government level agreements, bilateral collaboration is established also at the level of research performing organisations such as NAS, state research centres, and universities.

(Sub-)Regional Cooperation

A considerable number of S&T **cooperation agreements** have been signed with the neighbouring countries in the years immediately after independence. Russia still remains the main partner of the countries in the region. However, amongst others, the political situation in the region (e.g. conflicts in Tajikistan, Kyrgyzstan) influences strongly the scientific cooperation. Currently the political relations between TJ and UZ, as well as between KG and UZ are strained. On the other hand, the Turkmen interest in regional scientific cooperation increases and agreements with KZ and UZ exist.

Overall, the **regional cooperation** is still driven by past (meaning Soviet) personal or institutional links, although also new initiatives have been created in the

last few years. A good example for an existing regional approach is the **University of Central Asia**, which operates in 3 countries of the region, i.e. Kazakhstan, Kyrgyzstan, and Tajikistan.

The common thematic interests and joint priorities of the Central Asian countries offer the opportunity for collaborative approaches. Renewable energy, agriculture, and water research are very relevant for the entire region (see also above). The Eco-Regional Programme for Sustainable Agricultural Development in Central Asia and the Caucasus²², a consortium of eight National Agricultural Research Centres, eight Centres of the Consultative Group for International Agricultural Research (CGIAR consortium members) and three additional advanced research institutions (**non-CGIAR consortium members**), is an excellent example that the cooperation between the Central Asian countries can work successfully. Under this programme, for example, a centre of excellence with the countries of Tajikistan, Kyrgyzstan, Turkmenistan, and Kazakhstan has been established in recent years to support the transfer of information and experience exchange in the field of biodiversity.

Furthermore, the International Fund for Saving the Aral Sea (**IFAS**) with the five Central Asian countries as member states coordinates cooperation at national and international levels in order to use existing water resources more efficiently and to improve the environmental and socio-economic situation in the Aral Sea Basin. The Executive Committee of IFAS serves as a platform for a dialogue among the countries of Central Asia, as well as the international community. The Committee also achieved dynamic partnership with the institutions of the European Union (e.g. European Parliament, Council of the European Union, European Commission).

Another good practice example is **CACAARI**, the Central Asia and Caucasus Association of Agricultural Research Institutions²³, which aims at facilitating regional cooperation in agricultural research for development by providing a dialogue platform to the various stakeholders of the agricultural sphere, and supporting information flow from global organisations to local partners and back.

Agreements and Implementing Programmes between the EU and Central Asian Countries

In the 1990s, the European Union launched Partnership and Cooperation Agreements (PCAs) with the Central Asian countries that also provide an umbrella for cooperation in the scientific field. Moreover, the EU has strengthened its relationship with the whole region since the adoption of **"The EU and Central Asia: Strategy for a New Partnership"** by the European Council in June 2007. The objective of the strategy is to reinforce the EU-Central Asia political dialogue with regular meetings of EU and Central Asian Foreign Ministers. The document includes the following main topics: human rights, 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 of the EU assistance in the region. The EU Delegation in Astana (KZ), for instance, coordinates the activities in the region. Recently an EU Delegation in Bishkek (KG) was established. The existing Houses of Europe in Ashgabat (TM) and Tashkent (UZ) are an intermediate step in establishing an EU delegation in these countries.

Under the first initiative within the EU-Central Asia Strategy, the EU supports higher education cooperation, academic and student exchanges, for instance under the new **Erasmus Mundus** facility (5 Master Courses Students from CA 2011, partnership between 51 institutions from the CA countries) and **TEMPUS** (e.g. 7 current projects in KG) as well as on bilateral level. The European Commission is, for example, currently implementing projects in the field of the private sector development (Central Asia Invest Regional Programme).

The **Development Cooperation Instrument** (DCI) (2007-2013) is a programme for poverty reduction, sustainable economic and social development and the integration of Central Asia into the world economy supported by the EU with 719m. In general, DCI projects are not targeted to special research topics, but some of them benefit from scientific knowledge generation and are therefore at least to some extent related to scientific research. However, there seems to be a lot of room for advancing the link between scientific research and problem solving approaches for poverty reduction and social and economic development. 43 regional projects (e.g. "East European Co-opera-

tion Network in Food, Agriculture and Biotechnology for EU-Kazakhstan-Russia-Ukraine-Armenia-Belarus Countries") and 133 national projects (e.g. Food security and social protection in Kyrgyzstan) were developed under DCI (as of May 2011). Regarding the dissemination of the budget between the 133 national projects, Tajikistan receives with 30% (67.2 million) the largest share of funding for its activities. Out of the whole amount (176 projects), 29 projects contain educational and scientific issues (e.g. environmental problems and supporting in development of higher education).

The thematic interest of CA institutions in participating in **FP7** is very wide – they are to some extent linked to address global challenges through building strategic partnerships, to ensure stability and prosperity in the region. However, only 34 Central Asian organisations took part in different S&T projects within FP7 (until May 2011). The collaborative activities were supported by the EC with 1.7m (for all EECA: 38.25m). With 17 participations. Kazakhstan is the strongest partner in the region.

With the aim to enhance the participation of Central Asia in FP7, **National Contact Points** (NCP) were created in Kazakhstan, Kyrgyzstan and Uzbekistan. With 14 thematic NCPs and a National Coordination Office, Kazakhstan has the most developed NCP system. A similarly advanced structure can be found in Uzbekistan (13 NCPs). In Kyrgyzstan only one organisation is operating as NCP, generally coordinating the FP activities; however, it is planned to appoint further institutes to act as NCPs in certain fields of research. In Tajikistan, a National Information Point (NIP) is linked to other NCPs in the region and disseminates information about the application procedures within FP7. Currently, there is no acting NCP or NIP in Turkmenistan. Overall, the NCP and NIP network in the region is not financially supported by national governments.

At EU level, besides FP7 there is another key funding instrument, which supports research and innovation: the **Competitiveness and Innovation Framework Programme** (CIP). On the basis of Article 21.5 of the CIP regulation a third country may join CIP and the Enterprise Europe Network (a network of regional consortia providing integrated business and innovation support services for SMEs within EIP). However, the Central Asian countries are not involved yet.

²² <http://www.icarda.org/cac/>

²³ <http://www.cacaari.org/>

2.3 European Neighbourhood Region

Current State of S&T in the ENPI Region

S&T Indicators

Statistical data to evaluate the research performance of the systems are often missing or differ largely depending on the source.

In most EN countries, R&D gross expenditure is very low. Yet, three groups can be differentiated: The highest value is observed in Belarus, with an R&D expenditure of 0.65% (Table 3). The second group, i.e. the countries Georgia, Moldova and Ukraine spend around 0.4% of their GDP on R&D. Lowest R&D expenditure was reported for Armenia and Azerbaijan with less than 0.3%, which is similar to R&D spending in the Central Asian countries Kazakhstan or Uzbekistan (see Chapter 2.2.1). However, positive trends are observed. In some cases the change might seem undetectable, e.g. in Belarus the expenditure share has remained almost unchanged in 2001-2009, but since the country's GDP rose very rapidly, the amount of funding in nominal terms has also increased. In some cases the goals are ambitious; such is the case in Azerbaijan where a

recently announced strategy for S&T foresees a tremendous increase from 0.2% to 2% by 2015. However, it is also true that in some cases the spending dropped drastically as a result of the recent financial crisis.

All the countries have faced a significant decrease in the number of researchers, especially in the years immediately after the collapse of the Soviet Union. However, a positive trend has already been recorded in Belarus, where R&D employment increased by 5% between 2003-2008.

A common characteristic of the EN countries is that research is largely funded from the state budget with usually limited contribution from the private sector. Research is state financed whether through core funding and/or through competitive mechanisms such as programme type schemes and competitive grants. In certain countries (e.g. in Belarus) the predominant method for financing research has the characteristics of public procurement, with the project proposals selected on a competitive basis, either for basic or applied research, and the results owned by the state or state-owned organisations.

TABLE 3: S&T INDICATORS FOR THE EN COUNTRIES

Country	R&D expenditure as % of GDP (GERD)	R&D expenditure as USD per capita	Number of research organisations	R&D personnel: Number of employees
Armenia	0.27	12 ²⁴	83	6,926 ²⁵
Azerbaijan	0.2		146	22,500
Belarus	0.65 ²⁶	53.4 ²⁷	446	20,571
Georgia ²⁸	0.4		31	3,200
Moldova	0.42	n/a	38	4,764 ²⁹
Ukraine	0.82 ²⁹	ca. 24.5 ³⁰	1303 ³¹	141,1 ³²

²⁴ <http://www.unescap.org/stat/data/syb2009/15-Research-and-development.pdf> (data for 2007)

²⁵ National Statistical Service of RA, <http://armstat.am/> (data for 2009)

²⁶ Science, Innovation and Technology in the Republic of Belarus – 2008. Statistical book, State Committee on Science and Technology, Ministry of Statistics and Analysis of Belarus, 2009

²⁷ In 2010: 38.13 Euro

²⁸ Source: MES and SRNSF

²⁹ The Court of Accounts of Moldova Report <http://lex.justice.md/viewdoc.php?action=view&view=doc&id=338497&lang=1>

³⁰ 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”) Kiev, 2011, p. 178 (data for 2010)

³¹ ca. 8996 mln UAH R&D expenditure (2010) (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”) Kiev, 2011, p. 81) and ca. 45.8 mln inhabitants (1 January 2011) (State Committee of Statistics of Ukraine: Population of Ukraine as of 1 January 2011 (Державний Комітет Статистики України: Чисельність наявного населення України на 1 січня 2011 року), Kiev, 2011, p. 8)

³² 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”) Kiev, 2011, p. 10 (data for 2010)

Weak career prospects and motivation for young researchers is a common issue, due to wage disparity and much fewer opportunities in comparison to EU MS, resulting in a continuous brain-drain problem. However, attempts are made to attract young scientists usually through involvement in international programmes (as the joint CRDF projects for young researchers in Armenia, Azerbaijan and Moldova), and/or Diaspora funding (in Armenia and Moldova, and recently initiated in Georgia, too).

Research Policy and Structure of National Science, Technology, and Innovation Systems

The common “historical” background which was marked in most of the countries by the dramatic **downsize of the R&D intensity from the earlier 90s** (i.e. the collapse of the Soviet Union), led to shutting down or reorientation of research branches previously subordinated to Moscow. Most of the countries are still undergoing reforms of the S&T system or have just implemented them (usually few already).

Research policy: All the EN countries have legislation for S&T in place. There are numerous laws and amendments to the national strategies for the development of science, but very few have concrete quantitative targets or follow a comprehensive systematic approach.

Innovation was named a priority in most of the EN countries (where there is a law or a strategy). Generally there is a positive trend manifested through new laws on creating favourable conditions for innovation activities and designation of state bodies to be in charge of innovation policy development and implementation. S&T policies for innovation can be found in most of the National Strategies. Examples hereof are given below:

In May 2010, the **Armenian** Government adopted the Strategy on Development of Science, which describes the state policy towards the development of science for 2011-2020. The Law on the National Academy of Sciences of Armenia was adopted in 2011 which stipulates wider possibilities for the Academy to carry out business activities and commercialise R&D outcomes.

Azerbaijan's attempts to increase the role of innovation are expressed in rather specific strategies, e.g. National Information and Communication Technologies Strategy for the Development of the Republic of

Azerbaijan (2003-2012), the programme Creation of Regional Innovation Zone in Azerbaijan, or the State Programme on Development of Fuel and Energy Complex of the Azerbaijan Republic (2005-2015). However, the country has no medium-term or long-term vision of development, nor of R&D, while the short-term policy of RTD is inconsistent, which makes any meaningful planning difficult. A draft law about the state R&D policy was given the first reading in the Parliament of the Republic in 1998. After that two readings in addition took place but the law has not been accepted yet.

The legal basis in S&T and innovation policy in **Belarus** is currently formed by 443 operating legal acts¹. The Programme of Social and Economic Development for 2011-2015 foresees innovations and increase of investments. The Strategy of Science, Technology, and Innovation Activities formulated in this document includes the development of effective national innovation systems, increasing innovative activities of companies and the support to entrepreneurship and inventions. The State Programme of Innovative Development of the Republic of Belarus for 2011-2015 contains a list of priority measures and projects, funding sources, executors and stakeholders with the overall goal to develop new and modernise existing manufactures. Also the Belarusian Innovation Fund has been established, a venture capital facility has been initiated and SMEs are stimulated to participate in national S&T programmes.

The S&T activities in **Georgia** are regulated by two main legal acts: “Law on Science and Technologies and their Development”, and the “Law of Georgia on Higher Education”. Besides these two, the “Law on National Academy of Sciences” regulates the Academy's activities.

The main legal acts which regulate S&T in the Republic of **Moldova** are the Code on Science and Innovation, adopted in 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 gives the ASM governmental competence in the field of scientific research. Furthermore, Moldova companies are encouraged to use the innovation infrastructure facilities (e.g. technological parks, incubators, etc.) with 50% public support, while a draft law concerning venture funding is under public consultation following the Law on Science and Technology Parks and Innovation Incubators from 2007.

The legal basis of the S&T policy in **Ukraine** is composed of a number of laws such as “On Scientific and Scientific and Technological Activities” (last amendments 2010); “On Priorities of Science and Technology Development” (last amendments 2010); “On Legal Specifics of Functioning of the National Academy of Sciences of Ukraine, Field Academies of Sciences and Their Property Complex” (last amendments 2010); “On Innovation” (last amendments 2010); “On Scientific Parks” (last amendments 2010). The S&T priorities are defined according to the National Target S&T and Innovation Development Forecast Programme.

Taxation is usually high in all EN countries and is considered an issue throughout the region, although good practice examples exist, for example, in Belarus, where all research projects (national and international) are tax exempted. There is also a trend to reduce or waive customs duty on import of equipment (e.g. Georgia).

Legislation and specific agencies on **Intellectual Property Rights** are in place in most countries. In some cases rules and regulations as well as relevant bodies have been established from the early 90s. Georgia, for example, is a party to all main international agreements concerning IPR and thus legislative base of intellectual property protection comprises most of the elements necessary for its functioning. Also in the Republic of Moldova, the State Agency on Intellectual Property (AGEPI) is responsible for the protection of the intellectual property, issuing patents at national level. Nevertheless, there is significant room for improvements especially for the countries that are not WTO members (e.g. AZ and BY), which implies compliance with the WTO TRIPS agreements.

Research structure: The **Ministries of Education and/or Science** are usually responsible for S&T policy making while the Ministry of Economic Development implements innovation policy. However, in some other cases, **the Academy** remains the main contributor to policy making and implementation; such is the case in Azerbaijan and Moldova. In some cases, also new agencies for S&T policy programs were established with a relatively independent status.

In **Armenia**, the Ministry of Education and Science (MES) is the state-authorised body to develop and coordinate S&T policy-making. To improve the coordination, in October 2007 the State Committee of Science was created to carry out an integrated S&T policy in the country. Although the Committee is subordinated to

the MES, it is more independent. The National Academy of Sciences of Armenia, however, remains the main R&D performing organisation. Its status as highest self-governing state organisation was further strengthened following the law on the National Academy of Sciences of Armenia in April 2011. Since 2006, the Ministry of Economy is the authorised body for development and implementation of innovation policy, in cooperation and coordination with other concerned ministries and organisations.

In the absence of a Ministry for Science in **Azerbaijan**, the Ministry of Finance allocates funds for material expenditure, research projects, junior researcher employment and approval of vacancies for new appointments. On the base of the President's decree from January 2003, the Azerbaijan National Academy of Science is considered the main organisation which provides and organises science in the country. The Ministry of Economic Development participates in the formulation of state innovation and scientific technological policy although at present there is no concrete body which decides on the priorities of scientific, technological and innovation policy in the country.

In **Belarus**, policy-making and coordination in the field of STI are mainly carried out by the State Committee on Science and Technology (ranked as a ministry for S&T), and the National Academy of Sciences. The Committee is responsible for S&T and innovation policy and its coordination. The Academy organises, conducts and coordinates basic and applied research activities as the country's leading research organisation.

S&T policy in **Georgia** is developed by the Ministry of Education and Science. In accordance with the Presidential Decree #428 of June 2010, the Shota Rustaveli National Science Foundation (SRNSF) was established by merging two main funding entities, i.e. the Georgia National Science Foundation and the Rustaveli Foundation for Georgian Studies, Humanities and Social Sciences. The SRNSF develops S&T strategies and identifies thematic priorities for cooperation with foreign partner organisations. The Georgian Academy of Sciences is the advisory body and plays a leading role in setting national R&D priorities.

The Academy of Sciences of Moldova (ASM) is the sole public institution of national importance in the field of S&T in Moldova, and therefore the main coordinator of S&T activities. The Agency on Innovation and Technology Transfer (AITT), an auxiliary institution to

³³ 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”) Київ, 2011, p. 31 (data for 2010)

³⁴ All these documents are available in Russian at the Belarus Legal Internet-Portal, <http://www.pravo.by/webnpa/webnpa.asp>

the ASM, is authorised with functions of implementing innovation and technology transfer strategies and policies, and promotes the development of innovation infrastructure in the country.

In **Ukraine**, the structure for S&T is rather complex³⁵. The Parliament of **Ukraine** (Verkhovna Rada) is responsible for regulating public administration in S&T. A special Committee of the Parliament is responsible for education, science and innovation. The Ministry of Education and Science, Youth and Sports administers public funds allocated to innovation development based on a list of innovation priorities and S&T programmes approved by the Parliament. The Department of S&T Strategy and Programmes is responsible for the formulation and supervision of programmes and also for the progress of the Forecasting (Foresight) Programme of S&T Development. The Ministry of Economy is also responsible for supervision of some S&T programmes. The Ministry of Industrial Policy is one of the biggest actors in the area of S&T and innovation policy. The National Academy of Sciences of Ukraine is the highest state-supported research organisation with the right of self-government in decision-making about its activities.

Research activities are mainly conducted in institutes and centres under the coordination of **national academies**, with few exceptions, such as in Georgia where research institutes have been integrated in the university system (according to a recently completed reform). In Ukraine there is also an attempt to boost the integration of research at universities with the aim to train experts to carry out competitive research (Programme for Science in Universities 2008-2012). Research organisations across the EECA region face various problems. State funding for modernisation of research infrastructure and facilities remains low. Scientists oftentimes work with obsolete equipment; despite the difficult working conditions significant research results are achieved.

Besides the **considerable reduction in personnel**, the **aging of the remaining scientists** is another issue common to the countries in focus. Since a considerable part of the most active mid-age and young scientists have moved abroad or left the research sector,

currently the research teams are composed to a large extent by researchers close to the retirement age.

Reform of the **higher education system** along the lines of the Bologna process is a priority, especially in Ukraine, Belarus, Georgia and Armenia. Both private and public universities exist. The introduction of the accreditation system in Georgia helped to reduce the number of private higher education institutions and increase quality of the remaining. The significant number of successful TEMPUS projects in Ukraine is also proof of advancement of the Bologna process.

Priority setting in S&T: Usually there is a **more general set of priorities** (or “strategies”) for example to build a knowledge-based economy (BY), or strengthening the State of Law (MD), and a set of thematic/scientific field-oriented priorities, which, however, are in most of the cases either numerous or broad. It is not always evident how these priorities are set. State funding is not always distributed along the lines set and sometimes there is a discrepancy in the priorities of the National Academies for instance and those set by policy making bodies (AM). Priority areas do not necessarily receive more funding.

In some cases, following assessments of the results in the previous budget cycles, thematic priorities are (re)-defined and this is reflected in new cycles of national S&T programmes (BY). In other countries priorities are defined in accordance with national forecast programmes (UA). Overall, below some of the priorities the countries have in common are stated; for Azerbaijan no priorities were defined.

- Advanced technologies, information and communication technologies (AM³⁶, BY³⁷, GE³⁸, MD³⁹, UA⁴⁰)
- Renewable energy and energy efficiency (AM, BY, MD, UA)
- Life Sciences, biomedicine, medical equipment and technologies, pharmaceuticals and human health (AM, BY, MD, UA)
- Agricultural biotechnology, production, soil fertility and food security (BY, MD);
- Natural resource management, protection (AM, BY, UA)

- Nanotechnology, industrial engineering, new materials and products, chemical technologies (BY, MD, GE, UA);
- Space technologies, Earth Sciences (AM, BY)

³⁵ IncoNET EECA D5.1 – Assessment report on the current status of S&T statistics in EECA (2009)

³⁶ State Committee of Science, <http://www.scs.am/>

³⁷ Approved by the Decree of the President of Belarus 378 of 22 July 2010,

³⁸ Thematic priorities were identified by the Ministry of Education and Science of Georgia

³⁹ Partne<http://www.pravo.by/webnpa/text.asp?RN=P31000378rship> Agreement between the Government and the Academy of Sciences of Moldova for the period 2009-2012

⁴⁰ The Ukrainian priorities up to 2020 were defined in the Law “On Priorities of Science and Technology Development” from 2010

State of International Cooperation

National Policies and National Programmes Addressing International S&T Cooperation

In all EN countries, national STI policy acknowledges the **importance of strengthening international cooperation**. Provisions (articles, paragraphs etc.) are included in the respective national legislation (e.g. AM: Law on Scientific and Technological Activity, the Strategy on Development of Science and Action Plan 2011-2015; GE: Law on Science and Technologies and their Development; MD: Code "On Science and Innovation"; „Moldova Knowledge Excellence Initiative" Action Plan 2008; UA: National Indicative Programme 2011-2013). International S&T cooperation, for example, has got the special line in the state Belarusian budget and gets 3-4% of budget spending for R&D annually. However, there is no distinct policy document referring to the issue of International Cooperation in any country.

EN countries have a number of **national programmes** that are in operation. In some countries the programmes are open for foreign researchers (BY), in other countries programmes are open but funds are provided only to domestic researchers (GE and MD: The State Grants for Fundamental and Applied Studies), while there are also cases where programmes are more restricted (AM).

Bilateral Agreements and Programmes

EN countries have a number of **bilateral agreements** mainly with other CIS countries and countries of the EU. Some countries have also signed agreements with other non-EU countries such as USA (AM), Argentina (AM), China (AM, BY, MD), India (AM, BY) and Venezuela (BY). Moreover, bilateral agreements have also been signed by research institutions (mainly the National Academies of Sciences) with similar counter parts abroad (e.g. AM, MD, UA).

In addition to the national programmes, there are also a number of bilateral programmes in force involving national authorities in EU Member States as well research organisations and centres. Examples are:

- Collaborative Programme between CNRS, France and the State Committee of Science of the Republic of Armenia,
- the "Science and Technology Entrepreneurship Programme" between CRDF, USA and Georgian organisations,

- the collaborative calls between the Academy of Sciences of Moldova (ASM) and the Russian Foundation for the Humanities (RFH) as well as between the ASM and the German Federal Ministry of Education and Research (BMBF)
- Programmes of Belarus and Russia, e.g. the family of programs for developing supercomputers – "SKIF" (2000-2004), "TRIADA" (2005-2008) and "SKIF-GRID (2007-2010) - with its follow-up, "ORBISS" (2012-2015).

(Sub-)Regional Cooperation

Regional cooperation is based on the numerous bilateral agreements that exist between the countries as well as between specific research institutions (academies, universities, research centres) in the EECA region. Historically, collaboration with Russia is characterised by the highest indices (e.g. in Belarus 55% of the NAS's international projects are carried out with Russia). Furthermore, some bilateral programmes between the EN countries serve to enhance the cooperation in the subregion (e.g. Call for joint bi-lateral basic research projects 2011 between BRFFR (Belarus) and the State Committee of Science of Armenia). Overall, regional cooperation is mainly driven by past personal or institutional links often inherited from Soviet times and current political initiatives and programmes (BSEC, GUAM, CIS, ENP/ENPI, etc.).

Moreover, regional cooperation also benefits from **cross-border programmes** under ENPI (especially the Black Sea cross border cooperation programme 2007-2013, the Black Sea Basin Joint Operational Programme 2007-2013). Other international programmes/projects with EU countries mainly under FP7 provide opportunities for STI regional cooperation. Also important for fostering regional cooperation in STI is the participation of almost all ENP countries in regional organisations such as BSEC and/or GUAM which provide fora for political dialogue in various sectors including STI (see above).

Agreements and Implementing Programmes between the EU and the ENPI Region

All EN countries – except Belarus – have **Partnership and Cooperation Agreements (PCAs)** with the EU. These form the legal basis for EU relations with each country. The PCAs establish the institutional framework for bilateral relations, set the principal common objectives and call for activities and dialogue in a number of policy areas including S&T. In specific cases (e.g. in AM, MD, UA) the PCA has led to the approval

of concrete action plans listing precise commitments of the targeted country in order to meet EU standards.

All EN countries participate in 7th **EU Framework Programme** for RTD (FP7) as International Cooperation Partner Countries (ICPC). It is expected that Moldova will attain the status of an associated country by January 2012.

Until the end of 2010, the majority of countries had a quite limited number of successful proposals and the EC funding for EN participants under FP7 ranges between 1-3m per country. The only exception is Ukraine, which had 103 successful proposals with the EC contribution reaching approximately 12 million.

All EN countries have a developed **NCP structure** to support local researchers along the lines of the NCP structures in EU countries (i.e. NCP coordinator and thematic NCPs). In some countries the NCPs are financially supported by the national authorities (MD) or by the corresponding institutions (UA). In some other, NCPs are not funded (AM, BY, GE).

All EN countries are covered by the **European Neighbourhood Policy Instrument (ENPI)**. For each country tailor-made ENP Action Plans have been drafted taking on board differing national needs. With regards to STI, a common goal for all countries is closer integration to the ERA through more active participation of local research organisations in the EU Framework Programmes.

Funding through the ENPI focuses on strengthening democratic structures and good governance, supporting regulatory reform and administrative capacity building and on poverty reduction. The European Commission offered more than 900m for financing the activities in the EN countries for the period 2007-2010. Indeed STI is not seen as a priority area for funding as such but can benefit through, for example, regulatory reform and capacity building (as is the case with the operation of the Joint Support Office of the EC Nuclear Safety Programme for Ukraine). Few activities within ENPI are related to different scientific topics directly, for example the Capacity Enhancement for Implementing Bologna Action Lines in Georgia (Twinning); a Workshop "Traffic Regulations in EU in AZ"

(TAIEX) or a TAIEX⁴¹ Workshop on FP7-Opportunities for SMEs (MD); a Feasibility Study for the Improvement of Water and Sanitation System in MD (proposal); or preparatory studies for the modernisation of Ukraine's gas transit corridors and underground gas storage facilities (proposal).

According to **Competitiveness and Innovation Framework Programme (CIP)** regulations, the programme is open to third countries. From the EN, the countries Armenia and Ukraine⁴² participate in the Enterprise Europe Network of CIP (a network of regional consortia providing integrated business and innovation support services for SMEs) without however receiving financial support from the programme. In addition, Moldova and Ukraine participate in the Intelligent Energy Agencies initiative of CIP again without financial support from the programme. All other EN countries have not been involved yet with CIP.

All EN countries are involved in the **Lifelong Learning programmes (LLP)** and in particular in TEMPUS, which is the older one and in which the EN countries have a higher success rate, and in ERASMUS MUNDUS, which is becoming more popular but is still relatively new, with limited participation (e.g. 48 Master Courses Students and 23 projects for institutional cooperation and staff exchange in the six EN countries in 2011).

In general, the international mobility especially for young researchers remains low, with the exception of programmes in ICT area where a positive trend is recorded (BY). Visa remains an issue for the scientists in many countries, but in some others (GE) recently implemented visa procedures will make it easier, shorter and cheaper for scientists to travel to the EU.

⁴¹ Other TAIEX actions in Moldova are an expert mission on developing a guide on innovative clusters, a TAIEX study visit on the adjustment of the statistical data on innovation indicators as required by the EU, a TAIEX Workshop on venture funds, or the TAIEX expert mission on assisting Moldova in the preparation process for the association to the FP7.

⁴² EEN Members: <http://www.enterprise-europe-network.ec.europa.eu/about/branches>

2.4 Russian Federation

Current State of S&T in the Russian Federation

S&T Indicators

R&D as a percentage of GDP in Russia was 1.04% in 2008, which is the highest value among all EECA. Although it grew even further in 2010, it was still considerably lower than most global market competitors. Russian R&D allocation in 2008 expressed in PPP⁴³ corresponded roughly to the R&D allocations of Canada, India or Italy. Almost 65% of the total R&D budgets come from public sources. Only 29% stem from the business-enterprise sector and almost 6% from abroad. In terms of R&D performance, the business-enterprise (BES) sector consumes 63%, the government sector 30%, and the higher education sector around 7%. These data are, however, biased, because several publicly owned research institutes are organised as companies and counted to the BES. The strong overall dependence from public R&D sources is a major weakness and underpins the still underdeveloped innovation orientation of Russia's corporate sector.

Like other Eastern European Countries, also Russia faced a significant decrease of the number of researchers. R&D personnel in the RF counts 761,252 heads, which is 2/3 of the 1991 value. In full-time equivalents, Russia has 5 times more R&D personnel employed than Brazil, Canada, or Italy and little less than Japan. R&D personnel by 10,000 employees brings Russia at equal level to Germany and above the comparative values of Korea or UK. However, only half of the R&D personnel in Russia are researchers. If only researchers by 10,000 employees are considered, than Russia clearly falls behind Korea and UK. Since 1991, the highest

drop in absolute numbers of researchers occurred in the BES, which is the largest employer for researchers in the country. Ageing of R&D personnel remains a problem in Russia. More than 50% of researchers are above 50 years of age.

International mobility, especially for young researchers, remains low. Visa issues continue to be a serious barrier. New governmental incentives resulted in a reduction of brain drain, but income mobility of researchers is still limited. To improve this skewed position, Russia has launched the "Measures to Attract Leading Scientists to Russian Educational Institutions" in 2010.

Research Structure and Policy

Since the early 1990s, the transformation of Russian S&T and innovation policies went through different reform processes, which caused some painful re-structuring and downsizing effects, especially in terms of R&D personnel and resource allocation to the sector⁴⁵. The S&T system in the first half of the 1990s was doubtlessly not in the position to respond successfully to new economic and social requirements, which caused the government to introduce previously non-existent mechanisms and connections determining an S&T model corresponding to a market economy (e.g. introduction of competitive funding schemes; enhancing linkages with universities and teaching). Since the early 2000s, the then existing fragmented institutional S&T fabric was put together by several top-down measures to construct a modern-shaped national system of innovation (NSI) with a strong focus on supporting high-technology sectors of the economy. Since the system still has relational weaknesses in interlinking with economic and societal demands

TABLE 4: S&T INDICATORS FOR THE RUSSIAN FEDERATION⁴⁴

Country	R&D expenditure as % of GDP (GERD)	Number of research organisations	Number of R&D personnel (head count)
Russia	1.04	3,666	761,252

⁴³ PPP abbr. purchasing power parity. Data taken from „Science and Technology. Innovation. Information Society“, Pocket Data Book issued by the Ministry of Education and Science of the Russian Federation, the Federal Service for State Statistics and the National Research University – Higher School of Economics, Moscow 2010.

⁴⁴ Taken from „Science and Technology. Innovation. Information Society“, Pocket Data Book issued by the Ministry of Education and Science of the Russian Federation, the Federal Service for State Statistics and the National Research University – Higher School of Economics, Moscow 2010. Data produced by the Institute for Statistical Studies and Economics of Knowledge for 2010 (National Research University – Higher School of Economics, Moscow 2010) differ slightly, i.e. GERD 1.16%; number of research organisations 3,492; number of R&D personnel 736,540.

⁴⁵ The 4 stages concept and description are taken from the ERA.NET RUS deliverable D1.1. "The Russian S&T system", 2010.

and between different fields of policy, the transition towards a full-fledged functional NSI, well embedded in the social and economic realities of today's Russia, is an ongoing process.

Recently introduced measures support the creation of a structured national science and innovation policy framework including the identification of national priorities, introduction of performance-based budgeting, the (ongoing) restructuring of the governmental R&D sector, human resources and infrastructure development, etc. These attempts are programmatically advocated in main strategy documents, such as the "R&D and Innovation Development Strategy in the Russian Federation until 2015" (published 2006) or the Ministry of Education and Science's basic report "The Development of Innovation System of the Russian Federation" (published 2008). These and many other documents were consolidated and widened in the "Concept of a Long-Term Socio-Economic Development of the Russian Federation until 2020"⁴⁶.

Russia has a complex **S&T governance system**⁴⁷ with several interdepartmental councils and committees, e.g. Council by the President on Science, Technology and Education and the Committee of the State Duma of the RF on Science and R&D. The executive level involves the Government of the RF, federal ministries and agencies, as well as the Russian Academy of Science. The Ministry of Education and Science (Minobrnauki or MES Russia) has an important coordinative role in the area of S&T and innovation policy-making. Other important ministries are the Ministry for Economic Development and the Ministry for Industry and Trade. MES Russia also takes care of policy implementation and manages several major R&D funding programmes. It assures coordination and control of the Federal Service for Supervision of Education and Science (Rosobrnadzor), and manages state property, including the activity of federal science and high-tech centres, state science centres, leading scientific schools, national research computer network and information support to S&T and Innovation activity.

At the level of executive authorities an important role in S&T management belongs to the Federal Space

Agency (Roscosmos). It is not subordinated to any ministry, but directly to the government of the RF.

Historically, Russia, like other states of the former Soviet Union, has been characterised by a well-developed system of **public R&D institutes**. The Russian Academy of Sciences is the largest and most prominent research organisation in the country consisting of 468 research institutes (data for 2008). In addition, the sectoral Russian Academy of Medical Sciences and the Russian Academy of Agriculture are engaged in R&D. The mandate of the academies is to conduct fundamental research, but they also carry out applied research.

Universities until recently have occupied a rather modest place in the Russian R&D system. Only around 40% of the 1,114 HEI in Russia (data for 2009) are actually involved in R&D, and only around 20% of all professors and teachers conduct research⁴⁸. Nonetheless, the situation is changing. Funding from the Academies is redirected to universities through a number of new initiatives, foremost the awarding of a special status of a "Federal University" or "National Research University". These statuses are accompanied by generous federal budget funding.

Although the political elite puts innovation oriented R&D high on its agenda to support the diversification of the Russian economy beyond primary goods production, R&D performed in the business-enterprise sector is mostly carried out by often state-owned industrial research institutes and not by companies themselves. Also some large (both private and public) companies and financial industrial groups including a few large foreign companies conduct intra-mural R&D in Russia. The number of small innovative enterprises is remarkably limited and estimated at 25,000. It should be noted, however, that some statistical appropriation problems hinder an exact assessment. In general, it can be concluded that SMEs are still not in a position to act as engines of innovation and that large enterprises account for the majority of innovation activities. More than two-thirds of innovation expenditures are concentrated in two sectors: chemicals and chemical products, and machinery and equipment. Both sectors are dominated by large companies in Russia⁴⁹.

In 2010, a list of 8 national priority S&T areas were identified in the course of a national foresight exercise, which were approved by the President in July 2011⁵⁰:

- security and counterterrorism;
- industry of nanosystems;
- information and telecommunication systems;
- advanced weapons, military and special equipment.
- life sciences;
- rational use of natural resources;
- transport and space systems and
- energy efficiency, energy saving and nuclear energy

A detailed list of 27 critical technologies, which refines the broad thematic fields, reflects the most advanced Russian technological areas. Government support is directed towards these critical technologies and should lead to more innovative production and accelerated economic growth.

Over the last years, the Russian government continued to improve the legal framework for IPR in general and the regulation of IPR in Russia's publicly funded research sector in particular. The "Federal Law of Rights on Single Technologies", adopted in December 2008, facilitates the transfer of IP to private investors and the conclusion of licence agreements.

Despite the manifold efforts taken mostly by the public sector, Russia's innovation performance is still weak. Only 10% of the enterprises are engaged in technological innovation activities. Only 5% of the total sales are caused by innovative products. The technology balance of payments is continuously negative. Also in terms of research results, measured by the number and quality of publications, Russia is slowly losing its position in world rankings.

State of International Cooperation

National Policies and National Programmes

Enhancing internationalisation of the R&D sector has been identified as one important aspect for improving the quality and results of Russian R&D in the last years. Internationalisation, however, starts from a low level. Still many R&D organisations are isolated from

each other and from the outside world. Data on co-publication show that the USA and the EU countries Germany, France, UK, and Italy are the **top collaborating partners**. Cooperation with China and South Korea is quickly increasing.

To counteract **brain drain**, Russia implemented within the framework of its "Scientific and Scientific-Pedagogical Personnel of Innovative Russia for 2009-2013" an initiative to attract emigrants back to Russia or to develop various kinds of linkages. Moreover, in June 2010 another targeted programme⁵¹ aimed to attract foreign scientists was launched. A few Russian R&D programmes are also open for participation of EU researchers⁵². Main access obstacles are a lack of information about Russian research programmes, linguistic barriers and financial and legal issues.

Bilateral Agreements and Programmes

Russia has bilateral agreements and programmes with many states all over the globe in place. Since 1991 the USA has always been an important partner and among the first and largest investors in Russian science.

The EU is another important partner for Russia's R&D internationalisation attempts. Russia has concluded bilateral S&T agreements with a broad range of EU MS and countries associated to the FP. Agreements have also been established at the level of research funds. At the level of research organisations, especially the Russian Academy of Sciences has a dense network of cooperation agreements in place.

Findings of a survey conducted under the ERA.NET RUS project proved that bilateral cooperation is focussed on basic research. The most frequently used instrument is mobility support. Thus, not surprisingly, the budgets of bilateral agreements are mostly small scale and annual investment is usually below € million. Most recent trends show a shift from mobility towards more substantial R&D projects, a higher propensity for supporting applied research and innovation, and an evolution of bilateral towards multilateral schemes.

(Sub-)Regional Cooperation

Russia is still intensively connected to its neighbouring countries in EECA at different cooperation levels. At

⁴⁶ Approved by the decree of the government on 17 November 2008.

⁴⁷ Summary of the ERA.NEet RUS deliverable D1.1. "The Russian S&T system", 2010.

⁴⁸ Dezhina, I. and Spiesberger, M., Trends in stimulating internationalisation of the Russian R&D system: an inside and outside view. Paper not yet published, 2011.

⁴⁹ Information taken from ERA.NEet RUS deliverable D1.1. "The Russian S&T system", 2010.

⁵⁰ „Decree of the President of the RF #899, 7 July 2011 "On approval of the Priority Areas of S&T Development for the Russian Federation and the list of critical technologies of the Russian Federation", <http://graph.document.kremlin.ru/page.aspx?1;1563800>

⁵¹ The name of the programme in English is "Attracting leading scientists to Russian universities".

⁵² See <http://www.access4.eu/index.php> for more information

the multinational level, most important is the recently adopted Intergovernmental Programme for Innovation Cooperation of CIS member-states⁵³. Bilateral S&T agreements have been concluded with all EECA except Turkmenistan⁵⁴. In 2011, an intergovernmental programme for cooperation in the sphere of innovation within the Commonwealth of Independent States (CIS) was adopted. R&D cooperation within CIS is facilitated by the fact that Russian is considered as lingua franca among the scientific communities. In addition to the strong traditions and ties within the CIS, R&D cooperation with other Asian countries rapidly increases. RFBR for instance regularly runs joint calls with the Japanese Society for the Promotion of Science, the State Fund for Natural Sciences of China and with the Indian Department of Science⁵⁵.

Agreements and Implementing Programmes between the EU and the Russian Federation

Like the USA, also the EU and its MS had quickly reacted to the crisis of the R&D sector in post-Soviet Russia and established a specific funding programme in 1992 with INTAS, which terminated its operation just a few years ago. Currently the **EU's Framework Programme for Research and Technological Development** is the most important R&D instrument at Community level. Until the beginning of FP7, Russia consistently has had the highest project participation among the group of "third countries". Now its leading status is contested by the USA. Under the framework of FP7, Russia, which has concluded an S&T agreement with the European Commission for the first time in 1999, implements several "co-ordinated calls" with the EU, which are jointly defined and funded. Since 2001, S&T agreements between the EU and Russia are also in place for EURATOM covering fission as well as fusion-oriented research. Another framework for intensifying cooperation had been agreed in 2003 with the "four common spaces", which comprise a common space of research and education, including cultural aspects. Hereunder a series of measures, outlined in roadmaps for the year 2009-2011 and 2010-2012, to facilitate Russia's integration into the European Research Area, are implemented.

Russian scientists participate also in projects of the **European initiatives COST and EUREKA**. Among all non-COST member countries, Russia has the high-

est participation in COST actions. Russian participation in EUREKA, however, is comparatively low, which confirms the limited innovation capacities of the country.

Through the **International Science and Technology Centre (ISTC)**, founded in 1992 as an international organisation by USA, Japan, Russia, and the EU, substantial support to the Russian R&D sector is provided with the aim of conversion of military to civilian research.

Russia is also one of the target countries in the **EU Eastern Partnership and the Northern Dimension initiatives**. ENPI is the financial tool used to support Russia's participation in these initiatives.

The latest joint **EU-Russia initiative** is a "modernisation partnership", agreed in spring 2010. It includes cooperation in R&D and innovation. Regarding the latter, certain emphasis is on aligning technical regulations and standards and on enforcing IPR.

⁵³ <http://rs.gov.ru/topic/185>

⁵⁴ Taken from <http://mon.gov.ru/work/mez/dok/1075/>

⁵⁵ Information taken from Spiesberger, M. (2008): Country Report Russia. An Analysis of EU-Russian Cooperation in S&T. Prepared on behalf of the CREST OMC Working Group

2.5 Lessons learnt for a joint way forward



For enhancing the STI cooperation between the European Union and EECA, it needs to be acknowledged that the countries in Eastern Europe and Central Asia are transition economies on the way towards knowledge-based societies. Historically, they have been characterised by a strong S&T base at public level. The dramatic downsizing of the public R&D spending from earlier 90s (i.e. the collapse of the Soviet Union), led to shutting down or reorientation of research branches. Although most of the countries are still undergoing reforms of the STI system or have just implemented them, there is a strong need for capacity and institution building at national (or sub-regional) level to stabilise/advance the STI systems. Further, there is also a need to improve the innovation capacities particularly in the private sector. Generally, there is a positive trend manifested through new laws on creating favourable conditions for innovation activities and designation of state bodies to be in charge of innovation policy development and implementation.

Societal and global challenges (such as ageing populations, urban development, global health, climate change, and sustainable management of natural resources, energy and food security) are common for both the EU and the EECA region. As a consequence, new STI policies addressing common societal and global challenges need to be further advanced building on common policy priorities and needs.

There are traditionally strong links within the EECA S&T community, which are the basis for still existing (and partially growing) academic networks and even joint programmes (i.e. the CIS innovation programme). The STI cooperation of the EU with the countries in EECA is supported by several policy initiatives and respective agreements at various levels that also provide an umbrella for cooperation in the scientific field, such as Partnership and Cooperation Agreements (PCAs) of the EU with a variety of EECA countries, the EU-Russia Four Common Spaces (4CS) and the related Partnership for Modernisation, the Eastern Partnership of the EU and the European Neighbourhood Policy as well as the Agreements on Cooperation in Science and Technology – EU-Russia and EU-Ukraine, and last but not least the Development and Cooperation (DC) of the EU with Central Asia linked to the EU-Central Asia Strategy.

Although the countries in Eastern Europe and Central Asia share common traditional and historical links, there are social, political, and economic differences between the regions and among the countries. After the collapse of the former Soviet Union and the following economic decline of the 1990s, Russia gained the strongest economic and societal push. Not only its geographic dimension and size of population but also its economic and geopolitical weight (Russia is member of the G8 and UN Security Council) by far surpasses the other countries. Also in terms of S&T potential and absolute output, Russia is greatly ahead followed by the Ukraine. The intensity in STI cooperation with the EU (e.g. participation in the 7th EU Framework Programme for RTD) is strongest for both Russia and Ukraine. Similarly, the policy framework for STI cooperation is most advanced in Russia and the Ukraine with S&T agreement with EU and a number of Member States.

Although the S&T cooperation between the EU and the EECA partner countries is quite strong, there is still much room for its further development. Acknowledging the current global as well as societal challenges both regions are facing, new perspectives for the strategic S&T partnership between the EU, Countries associated to the present European RTD Framework Programme, and the EECA region should be developed building on each others' strengths and on common policy objectives such as to

- (i) create synergies by linking the scientific potential of leading researchers and innovators in partnership;
- (ii) ensure mutual access to unique S&T infrastructure and to pool resources for establishing new S&T infrastructure;
- (iii) remove still existing barriers for S&T cooperation and for joint innovation activities;
- (iv) pool resources for jointly addressing grand challenges such as climate change, sustainable use of global resources, food security, ageing societies, global health threats; and
- (v) reinforce industry driven partnerships and exploitation of markets to push knowledge-driven innovation.

Despite of national specificities, the countries in each of the two regions share a lot of commonalities which, in turn, provide the rationale for EU-EECA cooperation at policy level, among others:

- the geographic proximity; they are neighbours (in particular EE) and therefore share traditional societal and cultural links, economic proximity and strong trade as well as common regional challenges ahead (see European Innovation Union);
- the need for common (policy) frameworks allowing optimum use of opportunities (scientific, economic, political) through joint policy approaches;
- the need for strong public and private institutions on both sides to create a win-win situation; therefore institution building and institutional networking between the two regions need to be improved;
- to assure optimum brain circulation throughout the two regions for developing human capacities;
- to offer compatible, coordinated, or joint instruments for policy implementation assuring equal footing/balanced partnership and reciprocity.

Against this background the following chapter outlines the challenges and recommendations for joint policy responses to address common challenges and build on an enhanced EU-EECA STI cooperation.



3. Challenges and Recommendations on Enhancing EU-EECA STI Cooperation

3.1 Preamble

Building on the analysis of the state-of-art of science, technology, and innovation policies in the EU and the EECA, this section describes present challenges for both regions, which could be best addressed through fostering EU-EECA cooperation. Respective recommendations will be given, which are derived from good practice examples.

It needs to be highlighted that despite of national specificities, the countries in each of the two regions share a lot of commonalities. Along that line we will present the challenges in a generic way acknowledging that there are some issues which should be considered country-specific or which are not relevant anymore for some countries.

As far as the recommendations are concerned, they are addressed to a variety of stakeholders in the countries of the EU and EECA as well as to the European institutions building on common policy objectives and respective drivers for bi-regional cooperation.

Among others, the dedicated role of policy dialogue schemes and mutual policy learning is highlighted as well as the need for efficient and effective instruments and framework conditions for STI cooperation. As a consequence the benefits from developing a joint EU-EECA STI cooperation strategy should be emphasised including a joint action plan to be developed and agreed upon addressing relevant stakeholders on the EU and EECA side representing in particular the STI policy sector and the STI community incl. private sector.

3.2 Adjusting and Implementing Policy Strategies

Challenge: Creating and Using Knowledge for Evidence-based Policy Making

Investment in research, technological development, and innovation is a major driver of sustainable long-term economic performance. In order to raise the full potential of such investments, policy-makers benefit from an evidence base which evaluates the impact of present policies and implementing programmes and suggests options for their enhancement including the setting of policy priorities, structural aspects of the national STI system, and the advancement of implementation instruments as well as of the regulatory framework. Among others, these also address the governance of the science and innovation system, the definition and implementation of STI funding programmes, mechanisms for knowledge transfer between the public and private sector and priorities and tools for international cooperation.

Recommendation 1: Advancing national STI statistics – strengthening national statistical offices and raising capacities of staff

It is suggested to national policy stakeholders to fully introduce and further advance reliable and internationally comparable STI statistics at national level as well as the further strengthening of the capacities of national statistical offices. Targeted training activities for both decision makers and for personnel of national statistical offices are recommended as well as mutual learning exercises of EU and EECA experts to further advance indicators and tools for their measurements.

Indicators at international standards are increasingly applied for monitoring the performance and dynamics of national S&T systems and in estimating their development trends. To a growing extent they contribute to evidence-based policy making. Mainly driven by the OECD, the EU and the UNESCO, such indicators have been advanced and successfully applied partly for more than 40 years. On the EU side, those standards are widely applied leaving still room for further advancement with emphasis on the innovation domain. On EECA side, Russia has fully transferred its system to OECD and Eurostat standards as early as 1994. However, in the majority of the EECA countries some of the most important international STI standard indicators are not fully introduced in national STI statistics.

As a first step, the process towards applying international statistical standards (e.g. OECD-Frascati 'Family' Manuals, Eurostat methodological recommendations,

UNESCO science statistics) could be accelerated in interested EECA countries building on a project proposal developed by the IncoNets EECA and CASC. In this context, the aim is to create awareness for the need of common standards, to increase the knowledge about it including measurement tools and to learn lessons from the present implementation in some countries in the region.

Good practice examples:

- Under IncoNet EECA, a core set of methodological guidelines, definitions and model templates for S&T statistical surveys available in the national languages and tested in field trials was jointly developed by experts from the EU and EECA. The proposal "Modernising S&T Statistics in Eastern European and Central Asian Countries" was presented (for funding) to national authorities, UNESCO and the CIS Committee of Statistics.
- INCO-Net EECA and CASC International Training Workshops were conducted in Austria, Russia, Moldova and Kazakhstan to train statisticians and relevant stakeholders from EECA countries to transfer international statistical standards in national statistical practice.

Recommendation 2: Increase capacities of national think tanks to inform and advise policy

It is suggested to national policy stakeholders, to the EU Commission as well as to decision makers in the community of social, economic, and political sciences to strengthen capacities of think tanks at national and regional level in the EU and EECA and to increase their role in policy definition and its advancement as well as their role in the public discourse.

Think tanks are critical for policy stakeholders to addressing the complex societal and economic challenges through analytical and knowledge-based approaches. Among others, they provide new ideas for creative political solutions through policy recommendations to various political actors (parliament as well as individual political parties, governmental institutions, public administration).

More specifically, international cooperation and targeted training activities are recommended to enhance the capacities and the knowledge base of national think tanks. Joint workshops, seminars, and conferences could help to identify important topics, trends, and ideas for research, discussions, and public debate.

Furthermore, it is proposed to policy makers to take appropriate action to widen and deepen the system of think tanks among others through setting financial incentives for “science for science policy”. Here either national or regional programmes might be applied including dedicated action within the present EU RTD Framework Programme or its successor. In addition, twinning arrangements among think tanks in EU and EECA might support mutual learning and capacity building.

Finally it is suggested to share good practices between EU and EECA countries, among others through dialogue processes such as Policy Stakeholders Conferences (PSC), on how to implement and govern formal policy advisory structures (expert committees as well as scientific or innovation councils etc.).

Good practice examples in EECA countries:

- (i) the Economic Research Centre (ERC) in Azerbaijan,
- (ii) the Belarusian Institute of System Analysis and Science & Technology Sphere Information Support (BellSA),
- (iii) the Committee for Science, Technologies and Education of the President of the Russian Federation,
- (iv) the Centre for Economic Development in Uzbekistan.

Recommendation 3: Implement strategic policy mix reviews of national policies

It is suggested to national policy stakeholders to jointly plan and implement international STI Policy Mix Reviews for interested EECA countries as a mutual learning exercise between EU and EECA countries allowing at the same time to better inform political decisions and to increase the legitimacy of ongoing reforms.

Reviews and assessments of policies/strategies, programmes, projects and institutions – ex-ante, ex-post or during their implementation - as well as regular benchmarking exercises to compare performance with other activities/institutions attract a growing interest by policy makers as well as by decision makers in S&T organisations and research performing institutions. Building on the experience of EU Member States, a

number of international STI Policy Mix Reviews should be highlighted, which have been conducted under the umbrella of the Open Method of Coordination (OMC) on a voluntary basis in order to advance the STI policies of interested EU Member States. Those reviews were implemented by experts including policy makers from different other Member States. They rely on mutual trust among the institutions involved as well as on their shared confidence in the process.

Most of the countries of the EECA region are undergoing a period of transition/reform of their research systems. New strategies for RTD are launched and new laws implemented but, in most of the cases, with limited scientific evidence to support them.

Interested EECA countries are invited to express interest for such an STI Policy Mix Peer Review and experts from EU Member States, Countries associated to the EU RTD Framework Programme, and other EECA countries are invited to join review panels.

First pilot cases are offered to be planned and implemented within the ongoing INCO-NETs EECA and CASC. Internal and external expertise and logistic support is offered by the projects through a network of local partners with good knowledge of the STI policy landscape and with close contacts with the local authorities.

Good practice examples:

- The completed Policy Mix Reviews with the European Open Method of Coordination conducted for Austria (2008), Belgium (2007), Bulgaria (2008), Cyprus (2009/2010), Estonia (2007), France (2007), Latvia (2009/2010), Lithuania (2007), The Netherlands (2006/2007), Romania (2005/2006), Slovenia (2010), Spain (2005/2006), Sweden (2005/2006), and the United Kingdom (2007).
- The completed OECD country review of innovation policies for the Russian Federation (OECD Reviews of Innovation Policy: Russian Federation 2011⁵⁶)
- The UNECE review of the innovation performance in Belarus⁵⁷ and the one recently launched in Kazakhstan

Challenge: Embedding STI Policies in Overarching National Strategies Through a Holistic Policy Approach

In dynamic knowledge-based economies, S&T and innovation are among the drivers of social and economic development. In addition, S&T has a large potential to address today's complex societal and global challenges and propose respective scenarios for future sustainable development. In such multifaceted environments there is a strong need for embedding research policy in overarching governmental strategies on economic growth and social development to ensure a consistent and comprehensive policy approach and to raise the full potential of a scientific knowledge base for social and economic development and global problem solving.

This requires that at first the value of S&T will be acknowledged by the society as a whole and more specifically by other policy sectors and, at second, that appropriate mechanisms will be in place to link S&T policy making and its implementation with other policy sectors in a synergistic manner. In this regard there seems to be room for improvement both in the EU and EECA. However, there are a number of valuable policy approaches to be analysed both in the EU, in countries associated to the EU RTD Framework Programme, and in EECA.

The ongoing discussion on European Innovation Partnerships and their international dimension addressing societal challenges through knowledge-based approaches as a core element of the flagship initiative “Innovation Union” is of particular relevance.

Recommendation 4: Strengthening comprehensive knowledge-based cross-sectoral policy approaches at governmental level

It is suggested to political decision makers in EU and EECA to perform joint training seminars for policy stakeholders and key players from various sectors to increase knowledge on the role of S&T for social and economic development and for facing societal and global challenges. In addition, they should be informed about implementation mechanisms how S&T policy could be successfully built in into sector policies.

It is also proposed to national policy stakeholders as well as to the European Commission to implement mutual learning exercises on good practices of comprehensive knowledge-based national and regional governmental strategies in the EU and EECA region and respective implementation instruments.

A core prerequisite for embedding S&T in comprehensive governmental strategies is the awareness for the potential of S&T to drive social and economic development and societal and global problem solving. Success stories need to be communicated and analysed and lessons need to be learned for advancing national strategies and implementing tools accordingly.

International stakeholder conferences are considered an appropriate tool as they are implemented for the time being with support from the INCO-NETs EECA and CASC involving experts from various policy sectors, from the science and innovation communities, and from civil society. In addition, national and international think tanks are proposed to be invited to run accompanying analytical studies identifying good practice in policy making.

Finally, it is suggested to national political decision makers to introduce cross-cutting instruments applied by governments to better coordinate scientific approaches in support of different policy sectors.

This could include advanced dialogue processes at national level between the knowledge producers and the knowledge users to foster target driven research including accompanying socio-economic studies to be systematically utilized for sector policy planning and implementation.

Good practice examples:

- Integrated Programme of Scientific and Technological Development and Engineering Modernisation of the Economy of the Russian Federation until 2015⁵⁸
- The OECD Green Growth Strategy/Declaration⁵⁹ (signed by all 30 OECD countries plus Chile, Estonia, Israel and Slovenia) is a practical policy framework on how countries can achieve economic growth and development while at the same time preventing costly environmental degradation, climate change, and inefficient use of

⁵⁶ http://www.oecd-ilibrary.org/science-and-technology/oecd-reviews-of-innovation-policy-russian-federation-2011_9789264113138-en
⁵⁷ <http://live.unecce.org/fileadmin/DAM/ceci/publications/icp4.pdf>

⁵⁸ <http://www.st-gaterus.eu/en/542.php>
⁵⁹ <http://www.oecd.org/dataoecd/58/34/44077822.pdf>

natural resources. It brings together economic, environmental, technological, financial and development aspects into a comprehensive and overarching framework. Different policy tools will be combined.

- The Pilot European Innovation Partnership (EIP) on Active and Healthy Ageing: it engages stakeholders across policy sectors to contribute to its planning and implementation.

Challenge: Building Appropriate and Internationally Compatible National Legal and Ethical Frameworks Covering amongst others IPR, Taxation and Customs Regulations, Access to Labour Markets

New knowledge and innovative technologies are being developed increasingly within international networks. Cross-border exchange is constantly gaining importance. Nowadays, it is impossible for a country to progress in science and technology on its own. International cooperation on a European and global scale is vital for a country's scientific performance that influences economic and social development.

For being open to the "world", barriers for cooperation need to be removed (e.g. for international mobility, protection and utilisation of intellectual property, transfer of funds as well as scientific equipment, shipping of scientific material and samples, etc.), and appropriate legal frames should be designed according to international standards. In addition, to ensure real partnership, common ethical standards for conducting research (among others for clinical trials, the use of stem cells, the treatment of genetically modified organisms etc.) should be agreed upon and followed. At present and with respect to issues mentioned above there are still considerable obstacles for the EU-EECA STI collaboration which concern among others legal regulations for mobility of researchers (visa issues), joint utilisation and protection of intellectual property, taxation and customs' fees for the transfer of funds, equipment and legal restriction for shipping of biological and geological material and samples.

Recommendation 5:

Raising awareness and communicating good practice of regulatory frameworks stimulating international STI cooperation and fostering ethical standards for conducting research at national level:

It is advised to national policy stakeholders responsible for setting legal and regulatory frameworks in the EU

and EECA as well as to the European Commission to raise awareness of political decision makers for the need of stimulating regulatory frameworks for STI cooperation as well as for still existing barriers and threats which require urgent action.

It is suggested to national policy stakeholders in EU and EECA, to academic communities and their scientific associations, to establish ethical standards and to align them with international standards.

Along that line it is proposed to organise training seminars for legal experts from different governmental institutions and other relevant public administrations on international good practice of regulatory frameworks for STI cooperation, on international ethical standards for conducting research and on successful reforms of national rules and regulations.

Both in the EU and the EECA considerable efforts have been undertaken by the governments and public administrations to allow international openness of the respective STI systems. Accordingly there are a number of good practice examples to be shared. The setting of the internal and external regulatory frames for STI policies is usually a shared responsibility within a government including different policy fields (justice, internal and foreign affairs, finance etc.).

International S&T cooperation requires a high level of ethical responsibility and inter-cultural issues need to be taken into account. Cultural and moral diversity should, however, not lead to a laissez-faire driven erosion of ethical S&T standards or the conscious exploitation and capitalisation of legal gaps and moral-free action spaces (e.g. plagiarism). Thus, adequate forums to exchange and discuss existing ethical standards at regional level and global level should be further promoted and the participation of EECA countries in these networks enhanced. Standards, e.g. peer review standards or authorship standards, should be aligned and promoted throughout the scientific communities.

For optimizing present frameworks one can build on respective analytical outcome and dialogue and training activities offered by the coordination and support activities funded at present by the European Commission within the 7th EU RTD Framework Programme, namely the INCO-NETs EECA and CASC as well as BILAT RUS and BILAT UKR. Those projects and the new generation of IncoNets and BILAT projects could put a particular emphasis on sharing good practice among

(legal) experts from EU and EECA and for fostering a dialogue with the science and innovation communities on existing barriers and threats.

Good practice examples:

- The EU Visa Facilitation Agreements with Moldova, the Russian Federation, Ukraine, and Georgia.
- Visa-free travel of OECD nationals to Kazakhstan from 2012
- The European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (<http://ec.europa.eu/euraxess/index.cfm/rights/europeanCharter>)
- Visa-free visits of the EU, Switzerland, and Liechtenstein citizens to Ukraine since 2005 (the same is valid for several non-EU countries)

Recommendation 6:

Assessing and – if appropriate – advancing the national regulatory framework for the protection and utilisation of intellectual property according to international standards:

It is suggested to political decision makers in EU and EECA as well as to the European Commission to assure the application of international standards for the protection and utilisation of intellectual property, which should be formally agreed upon.

A core issue of any cooperation among different institutions is the fair treatment of intellectual background or foreground knowledge, which ensures the protection of the respective rights of the producers of it. The issue becomes particularly relevant in the innovation sphere if a commercial utilisation of knowledge is foreseen. Here, governments are asked to come up with national regulations which follow international standards.

Emphasis should be put on both the protection of each others knowledge and on the trans-national access to it allowing international exchange of scientific data and results while guaranteeing the rights of individual partners. Apart from national regulations, respective clauses should be systematically negotiated in international agreements on S&T cooperation and respective guidelines should be jointly developed. It seems to be of particular benefit for EU-EECA STI cooperation to define the common legal framework either within Partnership and Cooperation Agreements (PCA) or within dedicated S&T agreements

between the EU and selected EECA countries (e.g. RUS and UA). Those European agreements are recommended to be expanded to umbrella agreements, to provide a common legal frame for all EU Member States with Third countries.

Good practice examples:

- Recommendation of the European Commission on the management of intellectual property in knowledge transfer activities and code of practice for universities and other public research organisations from 10 April 2008 and respective resolution of the European Competitiveness Council of 29 May 2008
- Coalition for Intellectual Property Rights (CIPR⁶⁰) as a private-public partnership dedicated solely to the advancement of intellectual property protection and reform in the Baltic States, Russia, Ukraine, and other countries of the former Soviet Union. CIPR is an official observer at the World Intellectual Property Organization (WIPO) of the United Nations and the CIS Interstate Council on the Protection of Industrial Property.
- The agreement of the Customs Union on common principles of the IPR protection between Russia, Kazakhstan, and Belarus.

⁶⁰ <http://www.cipr.org/>

Challenge: Strengthening Institutions and Developing Efficient Tools and Instruments for Policy Implementation at International Standards

The implementation of political strategies oriented towards strengthening of national STI systems requires efficient and effective instruments as well as an appropriate administration fostering knowledge creation, circulation and exploitation in partnership with the international science and innovation community in order to tackle common societal challenges and to contribute to knowledge-based economies. In this respect, both the EU at national and community level and the EECA countries have long lasting experiences in developing and implementing STI policy strategies.

Among the tools and instruments, national as well as trans-national targeted STI (funding) programmes should be highlighted, which are open for international partners or which are coordinated at trans-national level. Here, particular room is seen for enhancing the EU-EECA STI cooperation through advanced national programmes and a better coordination among programme owners in both regions.

Recommendation 7:

Strengthening the implementation of national STI strategies through mutual learning of policy makers and STI administrations

It is suggested to STI policy makers in EU and EECA as well as to national administrations and the EU Commission to identify and share good practice of implementing national STI strategies through mutual learning. In addition it is recommended to conduct targeted training seminars on programme planning and implementation for national administrations (e.g. programme managers from public authorities and agencies as well as research councils) as well as to enable trans-national twinning among national administrations and implementing agencies and service providers in the EU and EECA.

Policy Stakeholders Conferences as they are implemented through the EU funded INCO-NETs EECA and CASC within the 7th EU RTD Framework Programme should be conducted with particular emphasis on an exchange of information and good practices on existing national and regional programmes as well as on appropriate mechanisms and technical tools for their implementation. Such mutual learning activities should also address different approaches to the institutional setting of programme implementation by

operating structures of ministries, public agencies, or private service providers.

Trans-national twinning of governmental management institutions of EU Member States and EECA countries should deepen mutual learning and should – once appropriate – pave the way to trans-national coordination of STI strategies and implementing instruments across the EU and EECA. Here, bilateral as well as multilateral instruments offered by ENPI should be exploited to provide support for such activities.

Recommendation 8:

Improving the quality of programme implementation through systematic evaluation and benchmarking according to international standards

It is proposed to political decision makers in EU and EECA as well as to the European Commission to further advance approaches towards systematic assessment of effectiveness and efficiency of national programmes using performance indicators at international standards. In addition, it is advised to conduct international benchmarking exercises of programme implementation to support mutual learning of programme owners.

Building on the experience of programme implementation both in EU and EECA there seems to be room for optimising national programmes as well as processes and tools for their implementation. As a key to gaining evidence, systematic approaches to programme evaluation and international benchmarking of STI programmes should be fostered.

For raising awareness, gaining information, learning joint lessons, and developing concepts for advanced evaluation and benchmarking exercises, training workshops of experts representing policy makers and programme owners are suggested. As a follow-up, pilot exercises could be implemented by joint EU-EECA teams on the one hand to test and validate the methodology and on the other hand to deepen the mutual learning of programme owners. Coordination and support activities like the new generation of IncoNets and BILAT projects to be supported within the 7th EU RTD Framework Programme seem to be appropriate mechanisms to facilitate both such training workshops as well as pilot exercises based on a request of policy stakeholders in both regions.

Challenge: Increasing Gross Domestic Expenditure on R&D (GERD)

GERD in % of GDP in the EU is around 2% on average (ranging from 0.5% for Cyprus to 3.8% for Sweden and Finland). In the EECA countries, GERD is below 1% with the exception of Russia (1.16%⁶¹). According to those figures both EU's and EECA's R&D investments are lacking behind the main competitors Japan (3.5%), USA (2.6%) and South Korea (3.1%). Against this background, in both regions there is considerable awareness for the need to increase R&D expenditures. Particular attention is paid to the contributions from the private sector, which is critical in most of the countries.

Recommendation 9:

Analysing the barriers for increasing public and private S&T expenditures

It is suggested to national governments in EU and EECA to analyse the obstacles for increasing public and private expenditures for S&T in order to strengthen the knowledge base for socio-economic development and for addressing the present societal and global challenges. Another priority should be given to developing a consistent policy mix for stimulating R&D expenditures of the private sector.

At first and despite the present challenging financial frameworks for most countries around the world, strategic decisions of governments are suggested in favour of a further increase of investments in the knowledge base of the economy and society targeting a figure of 3% out of which around two third should be spent by the private sector. This requires not only increased public spending. It seems to be even more challenging to strengthen the private sector and to raise its investments in R&D.

To facilitate mutual learning among policy makers it is suggested to conduct international policy stakeholder conferences to analyse good practice of comprehensive policy mix frameworks with the view to raise R&D investments in their country. Here, a link to recommendation 4 is given.

Good practice examples:

- EU-2020 strategy⁶¹: 3% target for GERD
- Azerbaijan recently announced a strategy for S&T to increase the GERD from 0.2% to 2% by 2015
- Kazakhstan wants to increase its expenditure on S&T to 2%

Challenge: Identifying and Addressing Global and Societal Challenges

Societal and global challenges (such as ageing populations, cities of tomorrow, global health, climate change, and sustainable management of natural resources, energy, and food security) are common issues for both the EU and the EECA region. For increasing efficiency and effectiveness of policy measures and making best use of shared knowledge and resources they can be best addressed through joint policy approaches and corresponding joint implementation scenarios. As a consequence, national strategies should be coordinated wherever possible following the concept of the present Joint Programming Initiatives of the EU.

Recommendation 10:

Fostering mutual learning and training of policy stakeholders in EU and EECA on how to address global and societal challenges

It is suggested to STI policy makers in EU and EECA to learn lessons from the various policy approaches of EU and EECA countries addressing societal and global challenges in order to enhance national strategies. In addition it is recommended to STI policy makers to increase the knowledge of public administrations about good practice for implementation instruments to reach the respective policy objectives.

Dedicated conferences and training seminars for different policy stakeholders as well as for experts from implementing institutions should be held in order to identify relevant societal and global challenges and to discuss strategies and implementation measures to address them most effectively and efficiently. Here analytical work is suggested beforehand supposed to provide a valuable knowledge base for policy discussions. Such studies could analyse potential effects of present or upcoming challenges on countries or regions as well as good implementation practice of different governments or international organisations.

Support for analytical activities as well as for mutual learning and training events could be given already by ongoing coordination and support activities funded within the 7th EU RTD Framework Programme, most prominently by the INCO-NETs EECA and CASC. Here, dedicated tasks are implemented and could be further adapted to the needs of policy stakeholders in EU and EECA.

⁶¹ Data for 2010, produced by the Institute for Statistical Studies and Economics of Knowledge, National Research University – Higher School of Economics, Moscow 2010.

⁶² http://ec.europa.eu/europe2020/targets/eu-targets/index_en.htm

Recommendation 11:**Contributing to international dialogue processes as well as to the international knowledge base on societal and global challenges:**

It is suggested to national governments and the EU Commission to proactively contribute to international dialogues on global and societal challenges, among others within the UN family (Intergovernmental Panel on Climate Change, Food and Agriculture Organisation, International Oceanographic Commission etc.) and within OECD fora and activities (Global Science Forum, etc.).

There is a huge variety of discussion and consensus building activities on joint approaches to address present global and societal challenges going on, which are often driven by international organisations like the UN institutions (UNESCO, UNDP, etc.), the OECD, and, to a growing extent, by G20. Taking over responsibilities for meeting such challenges and developing appropriate responses, national governments and the European Commission are in many cases aligned to such processes both at policy level and by sending national experts to respective committees or dedicated workshops and conferences. However, for many countries there seems to be room for getting closer involved.

It is further suggested to national S&T policy makers to foster the knowledge generation on the impact of global and societal challenges through the funding of data gathering based on international scientific standards for data production, collection, and dissemination.

Building on international science-driven consensus on how to monitor and to respond to global challenges, there are a number of observatories and databases in place (such as weather and climate observatories, data on biodiversity patterns, global health observatories, etc.), aiming at gathering scientific evidence according to agreed standard methodologies. It is crucial to widen the database among others through scientific projects, which in many cases depend on national funding by governments. Relevant activities should be jointly identified by EU and EECA policy stakeholders through mutual learning as proposed in recommendation 10.

Recommendation 12:**Fostering the international coordination of programmes addressing societal and global challenges beyond EU and EECA:**

It is proposed to policy makers and programme owners in the EU and EECA as well as to the European Commission to take action towards the coordination of national and European programmes with other global partners. In addition, it is recommended to jointly contribute to the implementation of recommendations of international dialogue processes at UN, OECD, and G8/20 level.

Going even beyond coordination of policy measures as proposed by recommendation 8, the nature of global and societal challenges suggests to further increase actions towards joint activities at global level. Here, it could be built on the experience of coordination and support activities funded within the EU RTD Framework Programme highlighting a number of ERA-NETs which have been implemented with participation of programme owners and managers outside the EU. The two international ERA-NETs targeting EECA should be highlighted: ERA.NET RUS and Black Sea ERA.NET.

New momentum is expected from European-driven Joint Programming Initiatives addressing joint transnational approaches towards global challenges. With this respect it is suggested to European stakeholders involved to put a stronger emphasis on raising the full potential of international cooperation through dialogue processes with interested partners from EECA and other regions of the world as well as with international public and private programme owners and financial institutions.

As a consequence of recommendation 11 and acknowledging the results from international dialogue processes, which were implemented with participation of EU and EECA policy stakeholders and national experts it is suggested to political decision makers in both regions on a case by case basis to exploit options for financial contributions allowing the implementation of international scientific initiatives towards global and societal problem solving with participation of the national S&T communities.

Good practice examples:

- Europe 2020 Strategy⁶³, which aims to address core societal challenges Europe is faced with to be addressed among others through Innovation Partnerships open to international partners.
- Water Initiative between the EU and Eastern Europe, Caucasus, and Central Asia (EECA)
- Interstate Commission for Water Coordination (ICWC) of the central Asian countries as part of the Interstate Council for the Aral Sea to support technical needs
- Global CGIAR Research Programme 1.1 'Integrated agricultural production systems for the poor and vulnerable in dry areas' covering crop improvement, natural resources management, livestock, aquaculture and fisheries, policy and institutions with implementation measures in Uzbekistan, Kazakhstan, Turkmenistan, and Azerbaijan
- Central Asian Countries' Initiative for Land Management (CACILM) which maintains, among others, a database with economic, social and environmental data. The initiative is supported by the Asian Development Bank (ADB), the Global Environmental Facility (GEF), UNDP, World Bank, IFAD, the German Association for International Cooperation (GIZ), and others.

Challenge: Making Optimum Use of International Cooperation

There is wide consensus that excellence in research stems from competition between researchers and from getting the best to compete and co-operate with each other. A crucial way to achieve this is to work across borders⁶⁴. Next to this quality acceleration and excellence justification for international cooperation, other rationales exist such as the support for market penetration and knowledge and technology transfer, acquisition of material and immaterial resources from abroad, sharing costs and risk through international division of labour (e.g. in the field of infrastructures), and supporting jointly global or regional development objectives.

Although the potentials for international cooperation are manifold in theory, the level of exploitation in practice is far from optimum. International cooperation is not always adequately represented in national S&T strategies, supporting instruments and programmes are often lacking or sub-critical, regu-

lar targeted meeting places to exchange S&T policy views and to establish joint initiatives are not yet a matter of course and available resources in general are often too limited, especially given the fact that international cooperation causes higher transaction costs than national or local S&T cooperation. In addition, especially smaller countries have to set regional or thematic priorities, because they are hardly in the position to cooperate everywhere in everything at uni- or bilateral basis.

To overcome the relative isolation of some partner countries from global cutting-edge S&T developments and to engage in meaningful S&T cooperation for the mutual benefit of EU and EECA, a more optimal use of international cooperation should be achieved.

Recommendation 13:**Functional STI policy dialogue fora between the EU and EECA countries should be further advanced:**

It is suggested to policy stakeholders from EU MS, the European Commission, and EECA countries to assess present formats of STI policy dialogue among both regions in order to identify options for the dialogue to become more efficient and effective as well as to increase the active participation of the countries in both regions in such policy dialogue fora. In addition, it is recommended to these stakeholders to support the generation of the needed knowledge base in order to ensure the best information. It is proposed to the European Commission to further support Coordination and Support Actions facilitating functional bi-regional fora for S&T policy dialogue, most prominently the INCO-NET and BILAT scheme.

At the moment, STI policy dialogue among the two regions is systematically taking place either between individual EU Member States and EECA countries or between the European Commission and selected EECA countries. In order to better address the joint challenges for both regions, there seems to be room for introducing advanced mechanisms for such a functional STI policy dialogue in order to provide a floor for regular information exchange on national strategies as well as internationalisation strategies and a respective clearing house for joint ideas and activities, a coordination forum for needs, suggestions and proposals targeting, among others, various aspects which are

⁶³ http://ec.europa.eu/europe2020/index_en.htm

⁶⁴ EC (2008): A Strategic European Framework for International Science and Technology Cooperation. Communication from the Commission to the Council and the European Parliament. Brussels: European Commission

addressed in this White Paper. Primary addressees of such a dialogue are supposed to be interested policy stakeholders to whom various discussion fora are offered. To assure an efficient dialogue it is important to evidence the knowledge base of the participants through relevant data collection and analytical studies. Here, one might build on the example of present Coordination and Support Actions within the EU RTD Framework Programme, namely the INCO-NET and BILAT scheme, which provide a targeted knowledge base for policy stakeholders to analyse and advance the STI cooperation.

As an additional element of such dialogues, the value of discussion forums allowing a direct interaction of policy makers with representatives of the science and innovation community and the civil society of both regions needs to be highlighted in order to provide policy stakeholders with an optimum framework for international STI cooperation.

Good practice example:

- Steering Platform on Research with the West Balkan Countries (<http://www.wbc-inco.net/about/mission.html>)

**Recommendation 14:
Optimising existing international STI cooperation frameworks at national level through mutual learning of policy stakeholders**

It is advised to national policy stakeholders in EU and EECA in cooperation with the European Commission to analyse good practice of existing national frameworks for international cooperation in terms of STI strategies, implementation programmes and stimulating regulatory frames.

As a first step, good practices on how other countries in the EU and EECA optimise the degrees of freedom for international STI cooperation within existing policy frameworks should be collected and exchanged. The respective dialogue among interested policy stakeholders from both regions to be built on such case-books can be supported by the present INCO-NET or BILAT-scheme funded within the EU RTD Framework Programme.

Complementing this approach, national policy-makers in EECA countries in partnership with the EU Commission are advised to make optimum use of the European Neighbourhood Policy Instruments or the Development Cooperation Instruments to advance national

capacities and built institutions for STI policy making and policy implementation with particular emphasis on international cooperation. Among others, options are provided through the “twinning” arrangements between EU Member States’ institutions and national authorities in EECA.

Good practice example:

- ENPI support for the association of Moldova to the EU RTD Framework Programme

**Recommendation 15:
Increasing capacities of National Information Points and National Contact Points for the EU RTD Framework Programme and for international cooperation in general terms**

It is proposed to national policy stakeholders in EU and EECA to assess and advance the support structures for European and international STI cooperation building on existing good practice. It is suggested to the European Commission and to individual EU member States to support respective capacity building in EECA. In order to allow the STI community to make the best use of European and international STI cooperation a sound knowledge of the respective framework is a core prerequisite and a major success factor. Against this background, efforts need to be undertaken at national level to provide professional and easily accessible services in terms of information dissemination and consultancy.

As far as the EU RTD Framework Programme is concerned the system of National Contact Points (NCPs) which is well established in the EU Member States has proven to be an efficient tool to be analysed by the national authorities in the EECA countries. Here, both the INCO-NET scheme, the BILAT scheme, but also the invitation to NCPs/NIPs in EECA to join European NCP networks facilitated via dedicated Coordination and Support Activities funded within the EU RTD Framework Programme are appropriate tools to foster mutual learning and capacity building in EECA. In addition, institution and capacity building with emphasis on NCPs/NIPs in EECA might also be supported through the European Neighbourhood Policy and Development Cooperation Instruments (ENPI/DCI). Such measures could be complemented by dedicated bilateral initiatives of EU Member States in partnership with interested EECA countries.

Good practice examples:

- IncoNet EECA: Analytical report for strengthening EECA NCPs/NIPs – Russia, 2009 (<http://www.inco-eeca.net/en/119.php>)
- Services of the International Bureau of the German Federal Ministry of Education and Research (<http://www.internationales-buero.de/en/index.php>)
- Services of the National Information Centre for Ukraine-EU S&T Cooperation (<http://www.fp7-ncp.kiev.ua>)

Recommendation 16: Increasing efficiency of national programmes through opening-up to foreign organisations and through trans-national coordination

It is suggested to national (and international) programme owners in EU and EECA to advance the framework for international STI cooperation through targeted opening of national STI programmes in EU and EECA countries to foreign organisations as well as through targeted trans-national coordination of funding programmes.

In order to increase the knowledge base of national research organisations and to benefit from international STI resources and infrastructures, the participation of foreign research organisations in national STI programmes should be allowed usually without the provision of funds.

Going beyond, it should be aimed at overcoming fragmentation and increasing efficiency of research funding in both EU and EECA through joining resources of programme owners on the basis of common interest and joint priority setting. To implement such schemes, lessons should be jointly learned from trans-national pilot activities of funding organisations (programme owners/managers) from EU Member States, countries associated to the EU RTD Framework Programme and EECA countries as they are conducted at present through the Black Sea ERA.NET and the ERA.NET Russia. These projects are dedicated coordination and support activities within the 7th EU RTD Framework Programme. ERA-NETs have a proven track record of catalyzing joint calls and programmes in areas of specific interest to participating programme owners. For such trans-national schemes, particular emphasis should be given to exploit options for complementing national financial contributions by funds from the EU and other international financial institutions including the Asian Development Bank, the World Bank and the European Bank for Reconstruction and Development.

Good practice examples:

- Joint calls for collaborative S&T and innovation projects within ERA.NET Russia (www.eranet-rus.eu) and Black Sea ERA.NET (<http://bs-era.net>)
- Joint Operational Programme Romania-Ukraine-Republic of Moldova 2007-2013, to allow neighbouring areas to jointly address development challenges. Partners from other countries can participate based on own funds.

3.3 Strengthening Research Performing Institutions



Challenge: Improving the Performance of STI Institutions

Almost all the countries in EECA have experienced series of reforms of their research systems during the last decades, aiming at the adaptation of their systems to the tremendous societal changes that occurred after the collapse of the Soviet Union. At the same time, the research institutions have faced a series of problems mainly in terms of finance and human resources, with varying levels of success in addressing them. In that context, improving the performance of STI institutions in EECA should constitute a key priority in the EU-EECA S&T cooperation.

Recommendation 17:

Preparing and implementing joint benchmarking exercises as well as systematic assessment procedures of research performing institutions

It is advised to national policy stakeholders in EECA and EU to set-up and to implement a systematic assessment procedure of their national STI institutions as a mutual learning exercise and as a way to share the good practices already in place in several EU Member States.

It is proposed to interested research institutions in EECA and the EU to jointly plan and implement benchmarking exercises of volunteering similar research institutions in several EECA countries, based on internationally accepted standards and procedures, as a mutual learning exercise between EU and EECA countries that will highlight best practices, contributing at the same time to the improvement of the performance of the participating institutions.

Prior to the implementation of any new measure or broader reform, the assessment of the performance of the national research institutions is a major challenge and a prerequisite, since it increases the pertinence and legitimacy of the reform as well as the acceptability of the measures deriving from it. Such assessment is equally important to the need to increase the funding level of the institutions since spending more in a not well performing institution could constitute a waste of funds and effort. Along that line, a national systematic procedure for the assessment of the performance of STI institutions, well adapted to the local conditions, but based on international standards, is a key element for a highly productive STI system.

In most (but not all) EU Member States the assessment of the performance of the research institutions

is a well established procedure. Moreover, several EU institutions are among the world pioneers in developing adequate approaches and methodologies for such assessments, adapted to various types of research institutions. The countries in EECA ready to integrate such systematic assessment procedures in their respective national research systems could benefit from the world-class know-how accumulated in some EU Member States on the development and implementation of such procedures. In that respect, joint EU-EECA evaluation and benchmarking exercises could be mutually beneficial by adapting existing knowledge to local conditions. The EU Commission could possibly provide support to such activities through specific instruments (ENPI and DCI in particular), following a formal request from the relevant national authorities in EECA.

Such joint EU-EECA effort could, on the one hand, take the form of a mutual learning exercise among STI policy stakeholders accompanied by pilot assessments in interested EECA countries to be planned and implemented building on the expertise of EU member states. On the other hand, interested but similar research performing institutions in EECA and EU countries could jointly plan and implement an international benchmarking exercise, based on internationally accepted standards and procedures available in EU member states. As a result, best practices across the participating STI institutions will be highlighted providing room for a self-assessment as well as evidence for improving institutional strategies, structures, and processes of under-performing institutions.

Good practice example:

- The EC funded STRATA project "RECORD": Under this project a method for benchmarking RTDI performing institutions has been established and tested in a couple of New Member States (the 'RECORD manual').

Recommendation 18:

Twinning activities between research centres or institutes

It is suggested to national policy stakeholders in EECA and the EU to encourage, provide the necessary framework conditions and possibly incentives for twinning arrangements between research centres or institutes in EECA and EU.

Twinning activities between similar or complementary research centres or institutes in EECA and EU constitute

a valuable tool for exchanging knowledge and good practices that goes beyond simple networking activities. Such twinning could take the form of memoranda or agreements between the respective research entities and could include a large variety of activities such as exchange of staff and young researchers, setting-up joint research projects, joint participation in international projects, sharing experience on equipment procurement and use, sharing infrastructure, etc. The twinning constitutes a long-lasting activity mutually beneficial for both institutions.

The national authorities should encourage twinning activities, providing the appropriate framework conditions and incentives or seed money for launching them.

Good practice example:

- The ERA-WIDE scheme launched by the EU Commission under FP7, which already supported research entities in Armenia, Azerbaijan, Belarus, Georgia, Moldova, and Ukraine. (http://cordis.europa.eu/fp7/capacities/international-cooperation_en.html)

Recommendation 19:

Training on institutional management tools

It is suggested to national policy stakeholders in EECA and the EU and to the EU Commission to organise trainings on management tools for STI institutions emphasising also on knowledge management, and to encourage the managerial staff of the research performing institutions to attain them.

During the last decades, the management model of the most renowned research institutions worldwide has changed drastically: from institutional funding to more or less rigid internal structures (divisions, laboratories, etc.), the model evolved to project oriented multidisciplinary research and funding, across laboratories and teams, with an increased involvement of the private sector, with a growing concern for the protection and exploitation of the research results, etc. Such transition is currently in place in most EU Member States with several countries and institutions pioneering in such changes and others still striving to adapt to it. In the EECA countries this transition coincided to the crisis (underfinancing, brain drain, etc.) faced by most of the research institutions. It is therefore understandable that an important effort

still needs to be made to adapt the functioning of the institutions to the new trends and requirements. In that respect, training on state-of-the art S&T management tools for the research managers should constitute a high priority for the research institutions and a field for joint EU-EECA activities. Such training could address competitive research, project writing and implementation, budget issues, contacts and cooperation with the private sector, protection and exploitation of Intellectual Property Rights (IPR). Training on knowledge management and IPR is of paramount importance especially for an enhanced international cooperation and participation of the private sector. It should be implemented in parallel to the improvement of the IPR legislation and system that needs to take place in several EECA countries.

In the context of the EU-EECA S&T cooperation, the aforementioned training could take the form of specialised seminars to be organised in the EECA countries and/or the form of mutual learning exercises through exchanges of research managers that will stimulate the spreading of good practices.

Challenge: Balancing Investments in Blue-sky Research and Target Problem Solving Through Institutional Road Mapping

Despite several attempts to reform the S&T system and institutions in the EECA countries, most of the existing research institutions served already the S&T system of the Soviet Union and inherited legacy of that system in terms of governance, organisation, promotion structures, and fields of activities. In that respect, the adequacy between the research orientations of the institutions to the current national conditions and needs is an issue that merits to be taken into account in order to strengthen the role of the institutions and the impact of their research output vis-à-vis present societal and global challenges. To address the issue of the role and orientation of a research institution, tools such as SWOT⁶⁵ analyses, Balanced Score Card approaches, and foresight exercises and are already in use by a number of well performing institutions in the EU Member States and beyond.

Recommendation 20:

Implementing SWOT analyses, BSC approaches, and foresight exercises in the research performing institutions

It is suggested to the national policy stakeholders to

provide incentives for and to the heads of STI institutions to implement institutional SWOT analyses, Balanced Score Card approaches, and foresight exercises allowing the development of strategies and institutional roadmaps that will strengthen the role of the institutions in the national research system.

A SWOT analysis of the institution can identify the current Strengths and Weaknesses (scientific output, human resources, role in education, exploitation of research results, infrastructure, finance, etc.), but also the Opportunities and Threats that may exist in the short term (national or local priorities and needs, evolution of the private sector, existing competition, etc.). Balanced Score Card (BSC) approaches help to align resources to objectives and facilitate strategic management decisions.

The institutional foresight exercise can outline scenarios for the potential role of the institution in the medium/long term (c. 20 years) by taking into account the broader conditions in the country and in the region (scientific and societal challenges, economic conditions, education, etc.).

The aforementioned tools can significantly assist the institution in defining its internal strategy and roadmap in terms of: optimum balance between basic and applied research, setting up multidisciplinary research programmes, planning of positions for new staff, re-organising research teams, defining equipment needs, etc.

SWOT analyses, BSC approaches and foresight exercises could constitute a priority for the EU-EECA S&T cooperation through joint implementation projects or mutual learning exercises (e.g. through visits to EU institutions that are currently applying such approaches).

Challenge: Improving the quality and quantity of STI infrastructure

As mentioned earlier, after the collapse of the Soviet Union, the research institutions in EECA suffered from a tremendous under-financing that stabilised at a very low level with only recent fragile signs of improvement in some countries. A direct consequence of this situation was the huge lack of investments in the research infrastructure in terms of state-of-the art scientific equipment but also in terms of buildings and labs, which are currently outdated or even missing for a majority of EECA countries. As far as the innovation infrastructure is concerned, substantial efforts were

undertaken by governments to establish institutions in support of the commercialisation of S&T outcomes. However, there is still a long way to go in particular due to the lack of innovation activities in the private sector. In the EU, several member states have experienced the same challenge during the last decades. This is particularly true for the Central European MS which underwent a tremendous reform process towards democracy and knowledge based market economies starting with the early 1990s. However, due to the higher spending for S&T both by public authorities and the private sector in the EU Member States, major and systematic investments were made in the STI infrastructure, which became particularly relevant after launching the European Lisbon agenda. To meet these ambitious goals, which had been reconfirmed through the Europe 2020 strategy, the updating of STI infrastructures remains a continuous challenge and requires an upgrade.

In addition, all EU member states realised that for infrastructures above a certain size a more coordinated approach was necessary to avoid unnecessary duplication of similar facilities, as well as a more efficient model of managing them based on an open access to users from the country and from abroad. This is true for the need of medium and large-scale S&T infrastructures following the roadmap of the European Strategy Forum on Research Infrastructures (ESFRI). This is also true for the innovation sector highlighting the example of the European Institute of Technology (EIT).

In that context, the necessary improvement of STI infrastructure including coordinated trans-national approaches to could constitute a key priority in the EU-EECA cooperation.

Recommendation 21:

Establishing a joint roadmap on improving existing S&T infrastructures and jointly building new ones in EECA, as well as on the mutual opening of infrastructures in both EU and EECA

It is suggested to the national policy stakeholders in cooperation with the national scientific communities in EECA and EU and possibly with support by the EU Commission, to initiate the establishment of a roadmap for the improvement of the S&T infrastructure in EECA and for the mutual opening of key infrastructures, building among others on the experience from the ESFRI roadmap.

As a first step for the preparation of such a roadmap,

⁶⁵ SWOT = Strength, Weaknesses, Opportunities and Threats

an inventory of existing major EECA infrastructure at national and regional level will be necessary, as well as a realistic prioritisation of the needs for updating or upgrading S&T infrastructure. Building on that inventory of infrastructures and needs, benefits from coordinated EU-EECA approaches should be analysed for identifying room for increased efficiency of S&T infrastructure development both in the EECA and the EU. The experience and approach implemented in the EU through the European Strategy Forum on Research Infrastructure (ESFRI) can be very valuable for the implementation of such activity.

In parallel, the modalities, necessary steps and possible barriers for the mutual opening of research infrastructures in both EU and EECA countries should be studied and precise recommendations should be addressed to the relevant national authorities.

Good practice example:

- The ESFRI roadmap (http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri-roadmap)

Recommendation 22:

Exploiting options of utilising ENPI/DCI funds for investing in STI infrastructure

It is advised to the national policy stakeholders in EECA as well as to the responsible authorities in the EU to explore the modalities for investments in STI infrastructure using ENPI/DCI funds.

The two EU instruments (ENPI/DCI) are valuable sources of funds for the support of capacity building activities and the construction or improvement of infrastructures in the target countries. As a general rule, the priorities and actions supported by the instruments are jointly agreed between the EU Commission and each relevant country, although a regional component also exists. Support to STI has not been a key priority of these instruments so far, mainly due to more pressing needs in other fields that have been forwarded by the beneficiary countries.

However, since on one hand the role of STI in the generation of growth is widely recognised and, on the other hand, pressing needs for evidence-based decision making in public affairs (e.g. in the sectors of health, climate protection, transport, social affairs etc.) are evolving, investment in STI infrastructure could be upgraded to a national priority to support by ENPI/DCI. To achieve this goal, a realistic assessment of the needs in infrastructure as well as of their

expected impact are a prerequisite before initiating any investigation among the national authorities in charge of the negotiation with EU and implementation of ENPI/DCI projects.

The EU-EECA STI cooperation could be instrumental in achieving the aforementioned goal through the development of roadmaps for improving the STI infrastructure (see recommendation above), as well as through assistance in the preparation of precise proposals to be addressed to the ENPI/DCI stakeholders, based on the accumulated knowledge in using similar procedures in EU Member States for support from the EU Structural Funds.

Specific attention should be given to the possibility to support the development of facilities of regional character in Eastern Europe, South Caucasus, or Central Asia, using the regional/multilateral components of ENPI and DCI.

Good practice example:

- The Operational Programme ‘Research and Development for Innovation’ of the Czech Republic (<http://www.strukturalni-fondy.cz>)

Recommendation 23:

Joint training in managing S&T infrastructures

It is suggested to the national policy stakeholders to set-up joint EU-EECA training activities on management of S&T infrastructures as a mutual learning exercise and as a way to share the good practices already in place in several EU Member States.

Managing S&T infrastructures, in particular medium- and large-sized national and supra-national research facilities, requires specific scientific but also managerial skills: optimisation of the governance of the facility, modalities for opening-up the facility to users from other institutions and from abroad incl. business models for sharing costs (fees, sponsors, etc.), providing services to the private sector where relevant, etc.

The EU Member States possess significant experience in managing larger S&T infrastructures (e.g. synchrotron facilities but also medium-sized installations in physics, chemistry, biology, etc.) to be shared with the EECA countries in the frame of joint training activities.

3.4 Strengthening of Human Resources



Challenge: Building Human Capacities

Building human capacities is of paramount importance for the strengthening of the research performing institutions. This is particularly true for the institutions in EECA countries that are facing an often dramatic decrease in their human potential due to brain drain and brain loss, as well as a simultaneous drastic change in the level and way of funding and functioning.

The EU-EECA cooperation could be extremely beneficial in that field, not only due to the longstanding experience of several EU Member States in the field of the development of human capacities in the research field, but also due to the similarities of the situation that several newer EU Member States faced during their transition to the market economy. In that respect, several mutual learning activities can be implemented addressing the science managers or the research staff.

Recommendation 24: Setting up joint training activities on science management

It is suggested to the national policy stakeholders to set up joint EU-EECA training activities on science management as a mutual learning exercise and as a way to share the good practices already in place in several EU Member States.

The joint training activities on science management should tackle issues like the development of project oriented research, the development of a framework and incentives for the engagement of the young generation in research carriers, the development of entrepreneurial skills, etc.

Such trainings should not only target the established hierarchies but also younger promising researchers for which issues like project-oriented research and entrepreneurship are of paramount importance.

Recommendation 25: Setting up twinning arrangements for training young researchers.

It is recommended to the national policy stakeholders to set-up incentives for twinning arrangements such as joint graduation programmes (Master, PhD) like international sandwich fellowship programmes⁶⁶, co-supervising PhD thesis ('these en co-tutelle')⁶⁷, etc., between Higher Education or Research Centres in EU and EECA countries.

The twinning arrangements constitute a very valuable decentralized mutual learning activity that can benefit to an important number of young researchers in various scientific fields. At the same time, such arrangements pave the way for long-lasting cooperation between the involved institutions and the beneficiaries of the schemes.

Good practice examples:

- The Erasmus Mundus Action 1 schemes: joint programmes (masters' and doctoral) with third countries.
- The Erasmus Mundus External Cooperation Window (action 2) with the Eastern European region including Russia and with the Central Asian region (co-operation in the field of higher education between the European Union and Third-countries through a mobility scheme addressing student and academic exchanges).

Challenge: Improving the Framework for International Mobility

International mobility of students and researchers between countries with different economic development levels is often perceived as a Janus-shaped activity: on the one hand it is regarded necessary to advance competences and careers, but on the other hand brain drain causes constant concern. It also goes without saying that brain drain can best be reduced if the domestic working conditions for researchers are at an internationally competitive level. A way forward is to develop schemes which support brain circulation. Also legal and procedural aspects have to be taken into account and implemented to guarantee interna-

⁶⁶ Also known as Partial Doctoral Fellowship or 'Sandwich Doctorate' it is a PhD Programme offered by some research institutions in collaboration with a (generally foreign) research institution. In such a programme, the PhD student initiates his PhD in his own country, usually taking classes and defining a problem. The second phase, varying from a few months to one or more years, takes the student to carry out research in the foreign institution. The third phase finds the student back in his home country to finish his studies and defend his thesis.

⁶⁷ The model for a joint supervision of a thesis ("co-tutelle de thèse") was introduced as a result of an initiative of the French Government to create a procedure for the joint supervision of doctoral candidates between French universities and universities in a number of other countries. Nowadays, arrangements using this co-tutelle model can be established between various universities in countries other than France. Co-tutelle arrangements are personalised conventions between a primary university and a partner university (the primary university being the institution where the doctoral candidate will defend his/her dissertation).

tionally recognised degrees⁶⁸, to promote international scientific education schemes, and to improve a more balanced flow of students and researchers (including visa issues). With respect to these issues, the Bologna process, which has been taken up by many EECA countries, provides a framework for cooperation and improvement of several aspects like mobility and quality assurance. Some nations outside the European Higher Education Area are very interested in the Bologna Process and are remodelling their own national systems taking into account the Bologna Process reforms.

Recommendation 26:
Enhancing alignment with the Bologna process through practical activities which support international scientific education schemes and a balanced students and researchers mobility
It is advised to national policy stakeholders in the EECA to create the legal basis and support for the higher education sector for facilitating the establishment of joint degree programmes (joint masters and doctorates), to enable co-tutelles de thèse with European partners (including the writing of dissertations in English) and to create more attractive conditions for incoming students and researchers.

First steps could be to foster a higher awareness on common degrees on a broad level, while recognising that a more comprehensive introduction of the ECTS is a major push-factor for common degrees. At the same time, capacity building measures to improve the information and knowledge base on common degrees of the relevant central university service functions have to be increased. To create more attractive conditions, also more courses in foreign languages should be provided and eLearning exploited to enhance the concept of common degrees in practice.

In general, most of these issues have to be addressed at national level, but coordination with partners from abroad can leverage better results. The Tempus and Erasmus-Mundus programmes of the EU are supportive to modernise higher education in EU neighbouring regions (including EECA) and to promote mobility. Erasmus Mundus Partnership is a complementary programme that funds student and staff exchanges and visits between European universities and universities from other countries.

Good practice examples:

- Good practices of Erasmus Mundus master courses (<http://www.emqa.eu/?AspxAutoDetectCookieSupport=1>)
- EURAXESS mobility portal, which provides information on jobs, services, rights and links, to promote the researcher's mobility (<http://ec.europa.eu/euraxess/index.cfm>)

Recommendation 27:
Establishment of a regional exchange instrument for joint doctoral programmes

It is suggested to national policy stakeholders in the Eastern European countries and especially the neighbouring EU Member States and countries associated to the EU RTD Framework Programme to establish a joint mobility programme for researchers (incl. pre-docs) based on university networks operating joint programmes, esp. Joint Doctoral Programmes, ideally leading to Joint PhDs.

A first step towards such a regional exchange instrument to support joint doctoral programmes would be a stock-taking of existing initiatives and agreements. In order to feature the neighbourhood aspect, it is recommended to identify the interest of potential partner countries from Eastern Europe but also from the neighbouring EU member states and countries associated to the EU RTD Framework Programme. Ideally, such an instrument does not create duplication with Tempus and Erasmus Mundus, but complements and forwards already existing initiatives supported by them.

Good practice example:

- CEEPUS – Central European Exchange Program for University Studies (including Western Balkan Countries and the Russian Federation) (<http://www.ceepus.info/>)

Recommendation 28:
Further facilitating the issuing of scientific visa

As major cross-cutting issue for the enhancement of scientific mobility it is suggested to national policy stakeholders in cooperation with relevant authorities to further simplify the issuing of visa for scientists, both in legal and practical terms, in all partner countries concerned on the EU and the EECA side.

Many scientific opportunities can be planned in time, but sometimes opportunities emerge at short notice. Unclear and lengthy visa application regimes can hinder or even make short-notice mobility impossible. The EU has substantially advanced this issue by introducing the scientific visa package, which facilitates the procedure of admitting researchers coming from non-European countries (third-country nationals) to Europe for the purpose of scientific research.

Challenge: Improving Quality of Communicating Science for Society

Science touches every part of life in today's global society. It is increasingly important that developments in science of relevance for society are effectively communicated to allow the public to have an informed opinion on controversial issues. Moreover, only if science is appreciated as a helpful tool for economic and societal development, it will receive the needed attention, regulation, and resources. The government and society might also benefit from more scientific literacy - since an informed electorate promotes a more effective democratic society. Moreover, facts uncovered by science are often relevant to moral decision making.

In times of global challenges, international S&T cooperation must not only be enhanced but also communicated and advocated to the public. The universal attitude of science facilitates understanding across borders and science diplomacy should support scientific cooperation for the progress of science and the progress of peaceful togetherness.

Recommendation 29:
Promoting science communication to increase public understanding and support including aspects of international S&T cooperation to tackle regional and global challenges

It is suggested to national policy stakeholders in the EECA and to the academic communities to put significantly more efforts on communicating science to public in general, and in particular communicating the challenges and virtues of international scientific cooperation to tackle regional and global challenges.

A first step would be to establish a repository of good practices on how journalists, politicians, governmental authorities, and other S&T programme owners as well as the science community as such enter into dialogue on the role of science with the general public, which itself is heterogeneous in terms of social and cultural

diversity. The international exchange on success stories and on lessons learned from science communication practices as well as targeted training seminars could be facilitated by international Coordination and Support Activities funded within the EU RTD Framework Programme like the INCO-NETs or through other targeted support activities. In addition, within such activities dedicated outreach measures to the general public could be planned and implemented to advance capacities for science communication in EU and EECA. Last but not least, joint study programmes on the communication of science between European and EECA universities could be explored and initiated.

Recommendation 30:
Implementing an EU-EECA Year of Science and Scientific Cooperation to communicate science for society and the benefits from bi-regional cooperation

It is recommended to national policy stakeholders in EU and EECA with support by the European Commission and in close partnership with the institutions of the academic communities in EU and EECA to plan and implement a bi-regional information and communication campaign on science for society and the benefits of EU-EECA S&T cooperation therein building on respective good practice in both regions.

Such a bi-regional Year of Science requires a shared vision and a coordinated effort of policy stakeholders, the science communities as well as the private sector. Against this background it is highly recommended to build on coordination and support Activities, namely the INCO-NETs EECA and CA/CS or their successors for consensus building and concept development.

A final decision should be taken at bi-regional policy level.

Good practice example:

- German-Russian Year of Education, Science and Innovation
- (<http://www.deutsch-russisches-wissenschaftsjahr.de/de/wissenschaftsjahr.php>)

⁶⁸ Convention on the Recognition of Qualifications concerning Higher Education in the European Region (so called Lisbon Convention), which was signed by most East European countries.

3.5 Strengthening the Role of the Private Sector



Challenge: Increasing the Engagement of the Private Sector in STI and Advancing the Academia-Industry Relationship

The engagement of the private sector in S&T is an issue not only in EECA but also in several EU Member States. It is well known that in addition to the target of 3% of GDP to be dedicated to research in the EU MS, the target of 2/3 participation of the private sector in the 3% objective has also been set and proves to be equally or even more difficult to achieve in several EU MS. However, the fact that the aforementioned targets have been set and still constitute a key objective in the EU, obliged the EU MS to develop strategies for achieving them as well as tools for monitoring their implementation and identifying the barriers that occur.

In EECA the private investment and, in a more general sense, the participation of the business sector in the research effort is extremely low in almost all the countries of the region: Almost all funds for research are public funds and to a very large extent the recipients of these funds are public institutions. As a general trend, the private sector funds RTD insufficiently, does not benefit from public RTD funding substantially and does not perform RTD systematically.

In addition, or as a consequence, the private sector in EECA does only partially participate in the definition of the national research priorities, it hardly benefits from the research results and does not exploit them to produce new products, services and growth.

In that context, the issue of increasing the engagement and participation of the private sector in S&T could constitute a key priority in the EU-EECA cooperation.

Recommendation 31: Initiating mutual learning activities on framework setting for private engagement in STI

It is suggested to the national policy stakeholders to initiate mutual learning activities on framework setting that will stimulate the engagement of the private sector in STI and will advance the academia-industry relationship.

Such mutual learning activities on framework setting should review in particular the legal frameworks, incentives and their impact, the ways to jointly involve the private and academic sector in research projects, the ways to develop in-house research in the business sector, the employment of researchers in the private sector, etc. It is obvious that such framework reviewing encom-

passes several national policies and involves national administrations well beyond the research sector. The involvement of these administrations in the mutual learning activities from the very beginning is a key element for their success but constitutes a challenge that necessitates a high level of coordination and commitment.

Recommendation 32: Involving the private sector in national and international STI policy dialogue processes

It is advised to the national policy stakeholders to increase the involvement of the private sector in the national STI dialogue processes and fora, in order to better identify its needs and expectations and to advance the academia-industry relationship.

Involving representatives of the most active players of the private sector in the national S&T dialogue processes and fora constitutes an important step for an increased engagement of this sector in the research activities of a country, for an advanced academia-industry cooperation and for informing the decision making level on the ways to stimulate such engagement and cooperation.

Through their involvement in such fora, the private sector representatives will not only expose their needs and possible expectations from the academic sector but will also receive information on the capabilities of the academic sector of the country and on the benefits the private sector could gain from a closer cooperation with it. In addition, such involvement in the dialogue can stimulate the development of in-house research in the private sector.

Furthermore it is advised to the national policy stakeholders and to the EU Commission to increase the involvement of the private sector also in the international STI dialogue processes and fora. Among these processes of particular importance is the multilateral EU-EECA dialogue organised at community level supported by the EU Commission, as well as the bilateral dialogue among individual EU and EECA countries.

Such involvement in the international STI dialogue processes can further stimulate the interest of the private sector in research activities by providing its representatives with a broader view of the international landscape and trends in STI. It can also initiate mutually beneficial cross-border industry/academia or industry/industry cooperation.

A series of EU-EECA Policy Stakeholder Conferences (PSC) bringing together policy makers and representatives of the STI community, organised with the support of the EU Commission fostering an advanced EU-EECA STI policy dialogue, constitute a valuable opportunity for the involvement of the private sector in such activities. Coordination and support activities funded within the EU RTD Framework Programme such as the INCO-NET and BILAT scheme provide an appropriate framework for facilitating such dialogue formats.

Recommendation 33:

Promoting the link of state-of-the-art EU initiatives such as research intensive clusters and technology platforms with similar structures in EECA and enhancing the participation of private companies from EECA in these structures.

It is recommended to the stakeholders of research-intensive clusters and technology platforms in the EU and EECA (private and academic sector, local and national authorities, EU Commission, etc.) to promote the linking between such structures and the stronger involvement of private companies from EECA in them.

In the EU, the Research Intensive Clusters, the European Technology Platforms (ETPs) and the Joint Technology Initiatives (JTIs) constitute state-of-the-art activities and structures bringing together the private and academic sectors as well as national or regional authorities. Similar structures are emerging in EECA (e.g. the Technology Platforms in the Russian Federation). Promoting the links among such structures in EU and EECA will be mutually beneficial allowing mutual learning, sharing experiences and possibly joining forces. Despite the rather autonomous character of the aforementioned activities especially in EU, the national authorities can intervene through incentives for joint activities, support to pathfinding missions, actions aiming at an increased visibility of innovation related structures in EECA towards structures in EU, etc.

In parallel, a specific effort should be devoted towards an increased participation of the private sector in EECA (e.g. innovative companies) in clusters, ETPs, JTIs, etc. Such increased participation in the aforementioned structures could further stimulate the engagement of the private sector in EECA in research and, reciprocally, can provide additional strength to the clusters and technology platforms. The modalities and conditions for such participation should be carefully prepared (IPR and other issues) and should be accompanied by

a well planned information and dissemination effort in EECA (e.g. dedicated Brokerage Events) in order to attract actors in the private sector not familiar with such initiatives. Here again the Coordination and Support Activities funded within the EU RTD Framework Programme such as the INCO-NET and BILAT scheme should be utilised.

Challenge: Increasing the Number of Innovative Companies

Increasing the number of innovative companies is still an issue and a target in several EU Member States. In that respect, incentives but also skill development measures have been set up in order to develop entrepreneurship and innovation management abilities especially in the young generations.

In EECA, the drastic changes towards the market economy in the last decades resulted in a strong increase in the number of private companies, mainly SMEs and especially in the sector of services. Unfortunately, the same increase has not been observed for knowledge-intensive sectors that could benefit from the strong academic tradition in the region. Therefore, in the context of the EU-EECA STI cooperation, increasing the number of innovative companies in EECA should constitute a priority for actions.

Recommendation 34:

Initiating mutual learning activities focussing on best practice examples in EU, in particular in the transition economies in the newer EU Member States

It is suggested to national policy stakeholders in EU and EECA to initiate mutual learning activities focussing on best practice examples for the stimulation of the creation and support of innovative companies. Particular emphasis should be given to examples from the transition periods of the newer EU Member States. In several EU Member States, a wide range of incentives has been offered to stimulate the creation of innovative companies. Among these we can mention seed funding, guarantees or loans, tax exemptions, setting up technology parks and incubators, incentives to hire young researchers, etc. The impact of all these measures was often below the expected level and even failures have been observed due to unexpected barriers or weak planning. However, the undeniable success stories that exists, along with the documented failures, constitutes a valuable knowledge to be shared among policy makers and innovation managers from both EU and EECA.

Particular emphasis should be given to mutual learning activities on success stories and failures in the transition economies in the newer EU Member States, since in these countries the overall context and development path presents some similarities with the one in the EECA.

Recommendation 35:

Setting up joint training courses on innovation management and entrepreneurship

It is suggested to the national policy stakeholders, to the academic communities and to the managers of innovation related infrastructures to set up joint EU-EECA training courses on innovation management and entrepreneurship.

Several national authorities and institutions in EU MS possess considerable experience and worldwide recognition in innovation management activities and in entrepreneurship development, which could be beneficial for the increase of innovative companies in the transition economies of the EECA countries. Therefore, joint training courses on innovation management and entrepreneurship should be set up within academic or innovation-related institutions in EECA, involving experts from both EU MS and EECA countries, with financial or indirect support (e.g. incentives) from the national or local authorities.

Recommendation 36:

Setting up collaborative competitive innovation funding programmes

It is proposed to the national policy stakeholders and to the EC Commission to set up collaborative EU-EECA competitive innovation funding programmes as an indirect or explicit mean to stimulate the development of innovative companies.

Such collaborative competitive innovation funding programmes should financially support joint EU-EECA R&D projects designed to lead in the medium term to innovative products, services or processes of significant economic and/or societal value. Such programmes constitute a valuable incentive that could either explicitly require or indirectly stimulate the creation of innovative companies.

Here, among others, EU-funded FP7 Coordination and Support Activities such as ERA-NETs stimulating the coordination of programme owners or INCO-NETs and BILATs fostering stakeholder dialogues for the benefit of bilateral/regional STI-cooperation could be

utilised for working out and testing joint activities of national EU and EECA owners/managers of innovation programmes.

Good practice examples:

- The competitive innovation funding scheme already under implementation in the context of the ERANET project for Russia (www.eranet-rus.eu).
- The intergovernmental programme for cooperation in innovation of the CIS countries, which was recently launched involving eight EECA countries (AM, BY, KZ, KG, MD, RU, TJ, UA).

Challenge: Providing an Appropriate Framework for Investments in the Growing EECA Innovation Sector

The ability to attract investments in the innovation sector is a critical issue in several EU Member States and in the EECA countries. Such investments (in the form of venture capitals, business angels, etc.) are of paramount importance for the transformation of the research results to commercially viable products and services. To succeed in that critical step, it is necessary to create and maintain an appropriate framework in terms of legislation, taxation, movement of funds, Intellectual Property Rights, etc. It is obvious that creation of such framework goes much beyond the competences of the authorities responsible for STI in every country and therefore necessitates a holistic approach.

In the context of the EU-EECA STI cooperation several activities could support the creation of appropriate frameworks for investment in the innovation sector in EECA countries.

Recommendation 37:

Implementing mutual learning activities on framework setting for investments in innovation

It is proposed to the national policy stakeholders through a dialogue with representatives of the science community as well as of the business and financial sectors in both EU and EECA to initiate demand-driven mutual learning activities on framework setting for investments in innovation.

Such mutual learning activities should focus on legislative, tax and IPR issues, as well as on the coherence and coordination of the whole framework, in order to identify good practices, success stories, but also barriers and failures in both EU Member States and EECA countries. The way the newer EU Member

States established such frameworks in their transition economies should require specific attention.

For implementing such international exercises, joint workshops or even smaller conferences are proposed, which might be implemented in the scope of INCO-NET and BILAT activities funded within the 7th EU RTD Framework Programme or at bilateral scale based on the partnership of individual EU Member States and EECA countries.

**Recommendation 38:
Promoting and encouraging investments from EU in the innovation sector in EECA**

It is advised to the national policy stakeholders in both EU and EECA to organise activities that will promote and encourage private sector investments from the EU in the innovation sector in EECA.

Such activities could include workshops, brokerage events or site visits involving, on the one hand, potential investors and, on the other hand, target innovative companies or individual inventors. A key step for such activities is the pre-selection of innovative institutions and concrete investment projects to be presented, which need to demonstrate sufficient evidence for their commercial viability.

In addition, policy support is proposed for such investment campaigns in order to raise confidence of potential investors in the respective national legal framework.

Challenge: Contributing to International Standards

Compliance with international standards or contribution to their development is of capital importance for the private sector and beyond (regulatory authorities, hospitals, etc.). At the same time it is a field where business and research are meeting.

The EU Member States have longstanding experience in terms of standards (CEN, CENELEC, contribution to ISO, etc.). In contrast, several EECA countries still have considerable efforts to make on that field, which will strengthen the position of the private sector in the international arena and will also contribute to the development of in-house research and/or to enhanced business-academia cooperation.

**Recommendation 39:
Initiating mutual learning activities in the field of international standards**

It is proposed to national policy stakeholders and to regulatory authorities in EECA and EU to initiate mutual EU-EECA learning activities in the field of international standards. In addition, targeted training activities addressing managers in the private and academic sectors are proposed.

Such mutual learning activities between EU and EECA should focus on the process for contributing to setting international standards or the approaches to comply with them, addressing also the role of research in that field. Such activities can contribute to the transfer of knowledge and identification of good practices. Twinning arrangements between national offices in charge of standardisation are proposed as they might be funded among others within the European Neighbourhood Policy Instruments and the Development Cooperation Instruments of the EU.

In addition, dedicated awareness raising and training seminars for the management of STI institutions should be foreseen in order to inform about the respective processes and support structures.

3.6 Strengthening the Sub-regional Cooperation



Challenge: Increasing Critical Mass and Avoiding Fragmentation through Sub-regional Cooperation

The STI policy dialogue activities between the EU and the EECA countries but also the analysis of the EU-EECA cooperation patterns among research institutions and teams revealed a relatively weak intra- and sub-regional cooperation (such as Central Asia, South Caucasus), especially when addressing the EU Commission, the EU Member States or the scientific community in the EU. Strengthening such cooperation would be beneficial for a more effective identification and promotion of STI priorities since it would reduce the fragmentation of the activities and would increase the critical mass of beneficiaries and therefore the impact of the EU-EECA cooperation.

Recommendation 40:

Fostering networking of STI policy makers and researchers in EECA sub-regions to increase critical mass and efficiency when addressing the European STI community

It is suggested to national policy stakeholders in the EECA sub-regions on the one hand to take appropriate action at national level for stimulating networking between the STI communities and on the other hand to strengthen policy coordination at sub-regional level, especially when addressing the EU.

Against the background of an under-critical financing of STI at national level, national policy stakeholders are advised to foster trans-national networking of national STI communities within a given sub-region in order to increase the effectiveness and efficiency of their activities. This could first of all be implemented through national strategies for sub-regional STI cooperation, following among others the example of the EU or the Nordic countries.

Particular value is expected from a stronger coordination among national policies in the EECA sub-regions when proposing research priorities or specific implementation instruments like coordinated national STI programmes or joint STI programmes at regional level as well as the coordinated utilisation of the EU assistance programmes ENPI or DCI. Such approaches are expected to considerably increase the 'weight' of the sub-regional STI policy since it will provide evidence for less fragmentation and larger impact.

The EU-EECA policy dialogue activities such as the series of Policy Stakeholder Conferences or the IncoNet type projects supported by the EU Commission could be further exploited for an increased coordination among policy makers at sub-regional level, since they provide the frame and means for such coordination as well as for mutual learning with STI policy makers in the EU.

Good practice example:

- The Nordic Council of Ministers for Education and Research consisting of Norway, Sweden, Finland, Denmark, Iceland, Greenland, Faroe Island (<http://www.norden.org/en/nordic-council-of-ministers/councils-of-ministers/nordic-council-of-ministers-for-education-and-research-mr-u/>)

In addition, it is advised to the scientific communities in the EECA to foster networking at sub-regional level in order to address the EU STI community more efficiently.

A stronger networking of the scientific communities in similar fields of science in the EECA sub-regions will increase the capacities and the visibility of such communities as well as the weight of their requests in terms of priorities and tools to be included in the cooperation with the EU. It will also contribute to the exchange of good practices among scientists acting in rather similar environments and to a better utilisation of resources (facilities, bibliography, etc.).

The EU Member States encouraged the networking of their scientific communities through e.g. the COST Programme⁶⁹. Similar schemes and programmes could possibly be developed at regional or sub-regional level in the EECA countries.

Recommendation 41:

Building regional centres of excellence through ENPI/DCI

It is suggested to the national policy stakeholders, to the academic communities and to the relevant authorities in the EU to investigate the possibility to build regional centres of excellence using ENPI/DCI funds.

Building regional or sub-regional centres of excellence (of research facilities) presents several advantages: reduction of fragmentation in terms of human

⁶⁹ COST Programme: European Cooperation in the field of Science and Technology (www.cost.esf.org)

resources, funds and effort, better visibility of the centre, contribution to networking and to spreading knowledge, etc. In addition to very large well-known centres (such as CERN, Dubna, ITER, etc.) many other of medium or large size exist (synchrotron facilities, metrological institutes, etc.).

Despite the obvious difficulties when planning such regional centres, the numerous benefits from the establishment of such a centre make the investigation for this possibility a challenging goal for the EECA region or sub-regions. The regional/multilateral part of ENPI and DCI constitute a privileged source of funds to address.

The EU-EECA policy dialogue activities such as the series of Policy Stakeholder Conferences or the IncoNet type projects supported by the EU Commission can provide the frame for the investigation of the possibility to build a regional centre of excellence and can also contribute to the transfer of knowledge that exists in the EU Member States for the establishment of such centres.

Good practice examples:

- The Nordic Institute for Theoretical Physics – NORDITA (<http://www.nordita.org/institute/index.php>)
- The Nordic Vulcanological Centre – NORDVULK (<http://www.norden.org/en/nordic-council-of-ministers/councils-of-ministers/nordic-council-of-ministers-for-education-and-research-mr-u/institutions-co-operative-bodies-and-working-groups/co-operative-bodies/nordic-volcanological-center-nordvulk>)



4. Short-term Implementation Scenario

Building on the one hand on the variety of recommendations given in chapter 3 and on the other hand on available mechanisms which could be utilised for their implementation, a first approach to a short-term implementation scenario is proposed for further consideration of different stakeholders in the EU and EECA. Here, particular emphasis is given to existing programmes like the EU RTD Framework Programme, the European Neighbourhood Policy Instrument (ENPI) and the Development Cooperation Instrument (DCI) as well as to ongoing and planned projects therein such as the INCO-NET, BILAT and ERA-NET schemes.

The following stakeholders are specifically addressed:

- national STI policy stakeholders as well as their implementing agencies
- science and innovation communities (funding agencies, research performing organisations, corporate sector) under their own responsibilities
- the European Commission with emphasis on Directorate General for Research and Innovation and Directorate General for External Relations
- the European External Relation Service
- the European Strategic Forum for International Cooperation (in Science and Technological Development).

As an overarching element of this implementation scenario it is proposed to interested STI policy stakeholders in EU Member States and EECA countries to develop a medium-term **joint roadmap for enhanced STI cooperation** to be built on common goals for mutual benefit and to be implemented in partnership through joint instruments. In this regard, the European Strategic Forum for International Cooperation (SFIC) might play a distinguished role by launching a new SFIC-Pilot Activity thus inviting EECA partner countries to join the dialogue and monitor upcoming activities. The process of developing a joint roadmap needs to foresee wider stakeholder consultations in particular with the science community and the private sector in both regions. In addition, cross-sector policy coordination should be built in to properly embed STI policy in comprehensive governmental strategies at transnational level tackling societal and global challenges.

In the short term it is proposed to

National STI policy stakeholders in EU and EECA

- to proceed with the policy stakeholder conferences as a tool for mutual learning, joint agenda setting

as well as for wider stakeholder dialogues with the science community, the private sector and the civil society as they are facilitated through the IncoNets EECA and CA/SC while shaping the format and the topics to be addressed according to the respective needs and interests of both regions (see recommendations 7, 10 etc.);

- to fully introduce and further advance reliable and internationally comparable STI statistics at national level as well as the further strengthening of the capacities of national statistical offices building on respective analysis, training workshops and recommendations undertaken within the IncoNets EECA and CA/SC (see recommendation 1);
- to jointly plan and implement international STI Policy Mix Reviews for interested EECA countries as a mutual learning exercise between EU and EECA countries building on respective pilot cases which might be supported by the IncoNet EECA and CA/SC (see recommendation 3);
- to advance the framework for international STI cooperation assuring at the same time reciprocity through targeted opening of national STI programmes for foreign institutions from either EECA or EU without or even with funding (see recommendation 8);
- to learn lessons from the various policy approaches of EU and EECA countries addressing societal and global challenges in order to enhancing national strategies building on analytical activities as well as on mutual learning events implemented by the INCO-NETs EECA and CASC (see recommendation 10);
- to set up systematic assessment procedures of national STI institutions as a mutual EU-EECA learning exercise by sharing good practices already in place in several EU Member States (see recommendation 17);
- to systematically involve the private sector in the national as well as bilateral/-regional EU-EECA STI policy dialogue, in order to explore the needs and expectations of this sector and to create awareness of the benefits of its cooperation with the academic community (see recommendation 32);
- to assess and advance the national support structures for European and international STI cooperation building on existing good practice in the EU Member States and utilising mutual learning and partnership arrangements (see recommendation 15);
- to take advantage of the coordination of national programmes in EU and EECA for setting up targeted bilateral or multilateral innovation programmes

utilising among others the ERA-NET scheme as well as future INCO-NETs and BILATs funded via the EU RTD Framework Programme while building on lessons learnt from the 2011 innovation call facilitated through ERA.Net RUS (see recommendation 8 and 36);

- to further simplify the issuing of visa for scientists, both in legal and practical terms (see recommendation 28).

Decision makers representing the science community in EU and EECA

- to prepare and implement joint evaluation and benchmarking exercises of volunteering similar research institutions in several EECA countries, based on internationally accepted standards and procedures, which can be prepared and implemented in the frame of ongoing future FP7 INCO-NET type projects such as IncoNet EECA and CA/SC (see recommendation 17).

Decision makers representing the private sector in EU and EECA

- to take appropriate action for involving the private sector of EECA in EU initiatives such as Knowledge and Innovation Communities and Joint Technology Initiatives (see recommendation 33).

The European Commission

- to keep on supporting policy stakeholder conferences as a tool for mutual learning, joint agenda setting as well as of wider stakeholder dialogues with the science community, the private sector and the civil society as they are facilitated through the IncoNet scheme;
- to support through the IncoNet scheme the planning and implementation of international STI Policy Mix Reviews for interested EECA countries as a mutual learning exercise between EU and EECA countries by funding respective pilot cases (see recommendation 3);
- to foresee coordination and support activities within the EU RTD Framework Programme in order to provide
 - room for mutual learning on good practice of national strategies and implementation instruments for international cooperation (see recommendation 14);
 - a methodological and organisational framework for joint evaluation and benchmarking exercises of volunteering

research institutions (see recommendation 17);

- assistance for assessing and advancing the national support structures for European STI cooperation building on existing good practice in the EU Member States (see recommendation 15);
- tools for coordination of national programme owners in EU and EECA for setting up joint innovation programmes utilising in particular the ERA-NET scheme as well as future INCO-NETs and BILATs while building on lessons learnt from the 2011 innovation call facilitated through ERA.Net RUS (see recommendation 36);

- to foresee in partnership with policy stakeholders in EECA dedicated activities within the European Neighbourhood Policy Instrument and the Development Cooperation Instruments in order to provide

- room for twinning arrangements of EU and EECA institutions supporting systematic assessment procedures of national STI institutions as a mutual learning exercise and as a way to share the good practices already in place in several EU Member States (see recommendation 17);
- room for twinning arrangements of relevant ministries and national STI administrations in EU and EECA allowing sharing good practice of developing and implementing national STI strategies (see recommendation 7);
- assistance for assessing and advancing the national support structures for European STI cooperation building on existing good practice in the EU Member States (see recommendation 15);

- to systematically involve the private sector in the bi-regional EU-EECA STI policy dialogue, in order to explore the needs and expectations of this sector and to create awareness of the benefits of its cooperation with the academic community (see recommendation 32);

- to open up EU initiatives such as Knowledge and Innovation Communities, Joint Technology Initiatives and Technology Platforms for the private sector from EECA utilising among others the potential of Coordination and Support Activities (such as present and future INCO-NETs and BILATs) (see recommendation 33).